THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXVI. No. 2143.] LONDON, JUNE 7, 1904. [56TH YEAR. PRICE 6d.

PARKER & LESTER,

— *ESTABLISHED 1830.* —

MANUFACTURERS AND CONTRACTORS, **ORMSIDE STREET, LONDON, S.E.**

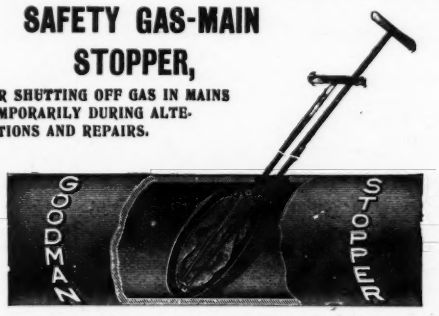
THE ONLY MAKERS OF

PATENT ANTIMONY PAINT & PARKER'S IMPERIAL BLACK VARNISH.

OXIDE PAINTS, OILS, AND GENERAL STORES, FOR GAS AND WATER WORKS.

SAFETY GAS-MAIN STOPPER,

FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.

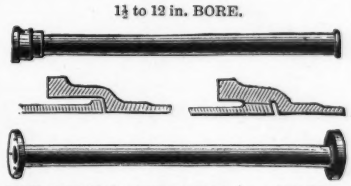


GAS-LEAK INDICATOR.

PRICES AND PARTICULARS ON APPLICATION.

GAS AND WATER PIPES

1¼ to 12 in. BORE.



THOMAS ALLAN & SONS, LIMITED,

Bonlea Foundry,

THORNABY-ON-TEES.

Formerly Springbank Iron-Works, Glasgow.

ESTABLISHED 1848.

Also Manufacturers of

SANITARY AND RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES AND GENERAL CASTINGS.

Telegrams: "BONLEA, THORNABY-ON-TEES."

CARLESS, CAPEL & LEONARD,

HOPE CHEMICAL WORKS, HACKNEY WICK, LONDON, N.E.,

And at Pharos Works, Hackney Wick.

NAPHTHA AND GASOLINE DISTILLERS AND PETROLEUM IMPORTERS,

Specially distil Carburine Spirit, specific gravity ·680, or of any other grade suitable for Enriching Gas; also Gas Oil best adapted for injecting into the Retorts, as in the Herring Process.

Importers of Petroleum for Carburetting Water Gas, or for Manufacturing Oil Gas. Distillers of Pentane, Petroleum Ether, and Naphtha for clearing the pipes of Naphthaline, &c.

Samples and Prices may be had on application.

MELDRUM'S PATENT

RETORT SCURFER

Saves its Cost many times each Year.

TESTIMONIAL.

Gas Office, Longwood,
Huddersfield, *Dec. 10th*, 1903.

Messrs. MELDRUM BROS., LTD., Timperley.

GENTLEMEN,

We have now had your Retort Scurfer at these Works for over Twelve Months, and having tried several forms of de-scurfing Retorts, we have no hesitation in saying that it is by far the best Apparatus we have tried for this purpose. **Two men have several times drawn a Setting of Seven Retorts, thoroughly cleaned the same, and charged the Retorts again within 6½ hours.** As a matter of fact, it is unnecessary for a Retort to be out of use more than 40 minutes for scurfing purposes if your apparatus is used.

After being subjected to the blast of steam and air which is injected, the scurf is easily removed with a bar without violence and consequent damage to the Retort itself.

I am, yours faithfully,
(Signed) J. H. BREARLEY.

WRITE FOR FULL PARTICULARS.

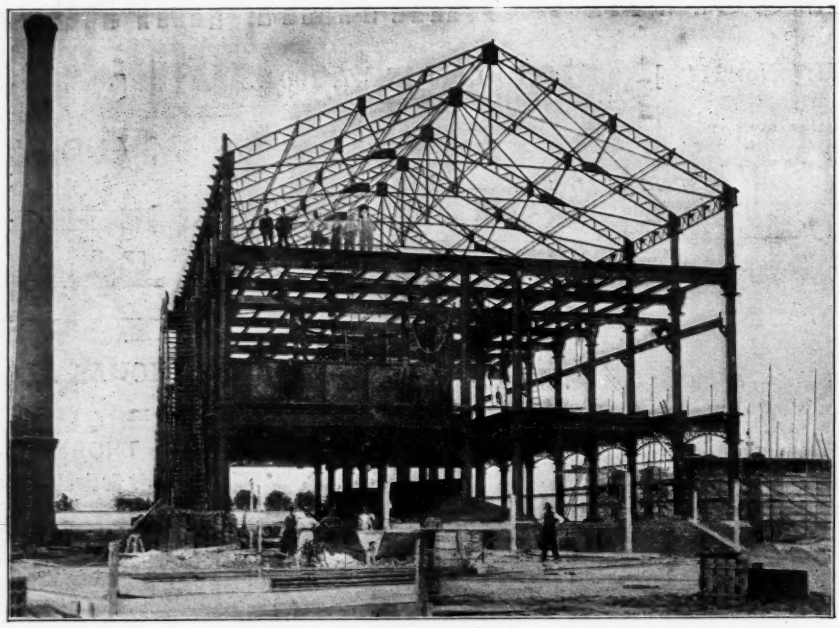
RESULTS GUARANTEED.

MELDRUM BROS., LTD., TIMPERLEY, MANCHESTER; AND 66, VICTORIA STREET, WESTMINSTER.

THE WHESSOE FOUNDRY CO., LTD.

Works: DARLINGTON.

MAKERS OF EVERY DESCRIPTION OF GAS PLANT



GASHOLDERS AND DRY-SEAL PURIFIERS A SPECIALITY.

PHOTO. OF STAGE-FLOOR PURIFIER-HOUSE TAKEN DURING ERECTION FOR THE UNION DES GAZ AT THEIR WORKS NANTERRE, PARIS.

London Office: 106, CANNON STREET, E.C.

JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.

Telegrams: "EVANS, WOLVERHAMPTON." London Address: Salisbury House, London Wall, London, E.C. National Telephone: No. 7039.

12,000 PUMPS

TRADE MARK.

Please apply for Catalogue No. 8.

STOCK AND PROGRESS.

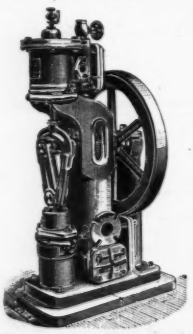


Fig. 705. "SINGLE RAM" STEAM-PUMP.

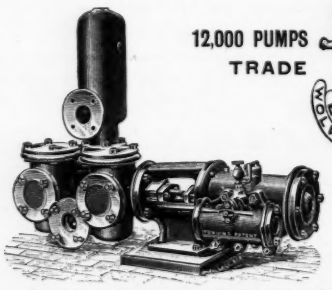


Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

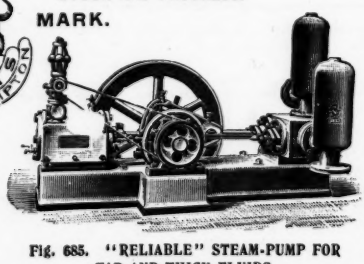


Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

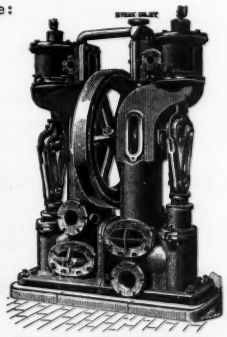


Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

—11 MEDALS.—

MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER FOR GAS, WATER, OIL, OR OTHER PURPOSES.

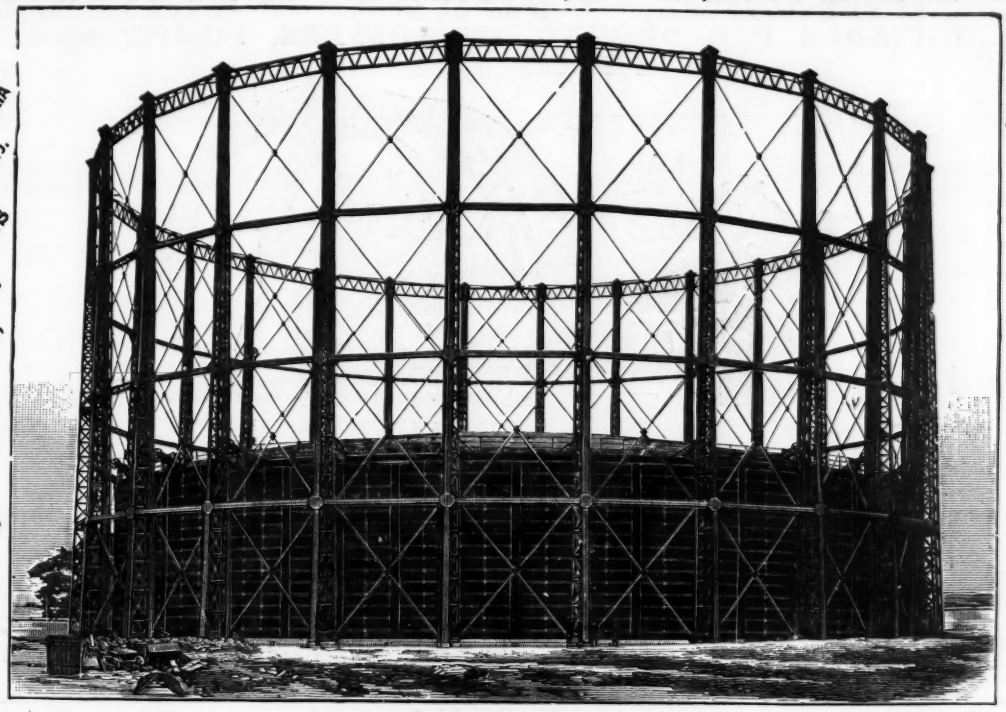
SCREWING TACKLE, BOILER MOUNTINGS, VALVES, COCKS, ETC.

LONDON: 108, Southwark Street. **MANCHESTER:** 33, King Street West. **BIRMINGHAM:** 114, Colmore Row. **LEEDS:** 6, Mark Lane, New Briggate.

THOMAS PIGGOTT & CO., LTD., BIRMINGHAM.

LONDON OFFICE 63, QUEEN VICTORIA STREET, E.C.

GAS PLANTS, BOILERS, ENGINES, PUMPS, ROOFS, RETORT FITTINGS, ETC.



TELEGRAPHIC ADDRESS: ATLAS BIRMINGHAM

WELDED & RIVETED PIPES, FOUL MAINS, RETORT LIDS, WROT & CAST TANKS, PURIFIERS.

MANUFACTURERS OF

Humphreys & Glasgow's Carburetted-Water-Gas Plant.

INSTALLATIONS HAVE ALREADY BEEN ADOPTED WITH AN AGGREGATE CAPACITY OF 150,200,000 CUB. FT. DAILY.

HARRIS & PEARSON,

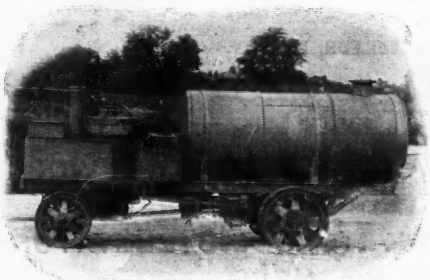
STOURBRIDGE, ENGLAND,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

HIGHEST AWARDS WHEREVER COMPETING.



STEAM TANK WAGONS

FOR

LIQUOR

UP TO

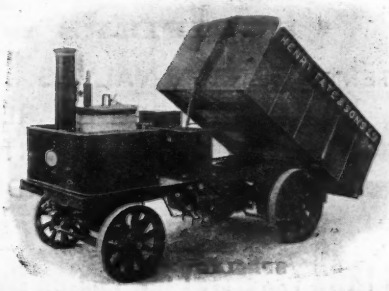
7 TONS.

TIP WAGONS and LORRIES of ALL KINDS for the CONVEYANCE of COAL or COKE in BAGS or BULK.

Also PETROL VANS and PLEASURE CARS.

Reliability.
Simplicity.
No Chains.

THORNYCROFT

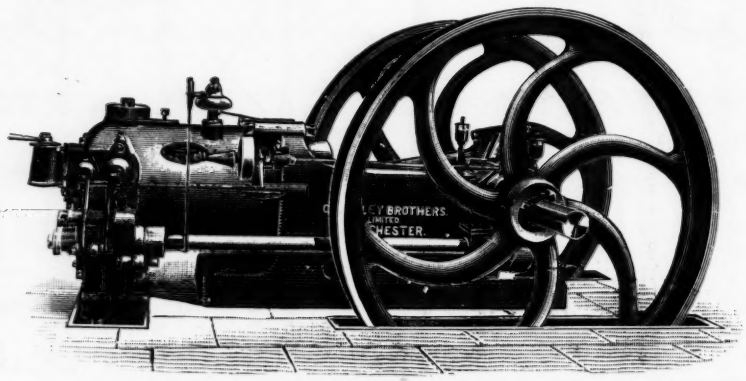


The Thornycroft Steam Wagon Co., Ltd.,

HOMEFIELD DEPÔT, CHISWICK, LONDON, W.

CROSSLEY'S GAS-ENGINES

SUITABLE FOR DRIVING EXHAUSTERS, PUMPS, &c.



Represents "XA" Type giving 60 Effective Horse Power.

ENGINES DELIVERED—Up to the end of 1903, 48,839 Engines have been delivered representing 701,700 B. H.P.

IMMEDIATE DELIVERY FOR STOCK SIZES OF ENGINES.

Large Number of Second-Hand Engines always in Stock.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND AND WEST OF ENGLAND DISTRICT OFFICE: *6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.*
Telegraphic Address "WIGAN, BIRMINGHAM." Telephone No. 200.

LONDON DISTRICT OFFICE: *6, STRAND, LONDON—C. PARKER & SON, Sole Agents.*
Telegraphic Address: "PARKER LONDON."

NEWTON, CHAMBERS, & CO.,

LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

Established 1790

LONDON OFFICE: **19, Great George Street, WESTMINSTER.**

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS IRONFOUNDERS, & CONTRACTORS.

MANUFACTURERS OF EVERY DESCRIPTION OF

PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS.
RETORTS AND FITTINGS, MOUTHPIECES WITH SELF-SEALING LIDS.
IMPROVED COAL AND COKE HANDLING PLANT CONVEYORS AND ELEVATORS.
CONDENSERS, SCRUBBERS, AND WASHERS.

PURIFIERS with Planed Joints a Speciality.

PATENT CENTRE-VALVES, RACK AND SCREW VALVES, WOOD GRIDS AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS.
STRUCTURAL WORK, COLUMNS, GIRDERS, AND ROOFING.
GASHOLDERS CAST-IRON OR STEEL TANKS.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (SPECIAL QUALITY) for Engine Cylinders. GAS COAL famous for its unrivalled excellence.

THIS TALKS!!!

We have Lighted a Section of Plymouth Docks
for the Great Western Railway Company.

An Extension has been Ordered. .

We have completed at Aylesbury an Installation—Town Hall, Market, &c. .

The Council has unanimously decided that we be requested to do the whole of the Public Lighting.

We are

50 per cent. Cheaper than Incandescent Gas.
70 ,, Electric Arc.
80 ,, ,, Incandescent.
120 ,, Ordinary Fishtail.

BERLIN, the Finest Lighted City in the World, **has adopted Millennium**

It is the LAST WORD.

THE MILLENNIUM SYSTEM IS A METHOD OF COMPRESSING ORDINARY GAS. . . . .

If you want to get MORE LIGHT and CUT THE COST, write—

The British Compressed Gas Co., Ld.,

57, BARBICAN, E.C.

F. C. SUGDEN & Co.

CARBONIZING SPECIALISTS.

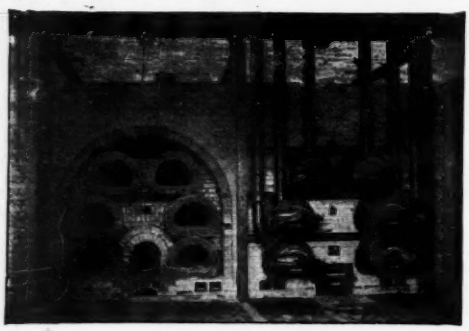


PHOTO. OF REGENERATOR SETTINGS DURING CONSTRUCTION

REGENERATOR & GENERATOR SETTINGS

DEEP, SEMI-DEEP, AND SHALLOW.

Maximum Make per Ton and Mouthpiece.

Minimum Fuel Consumption.

NUMEROUS REPEAT ORDERS

Have been received for each of the above types of Settings.

RESULTS GUARANTEED. RETORTS RESET.

SOLE MAKERS OF **CRIPPS' PATENT CHIMNEY.**

Designs and Estimates on application. **28, EAST PARADE, LEEDS.**

COAL TAR PRODUCTS.

Benzol, Toluol, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Crude Creosote Salts, Granulated (Crude) Naphthalene, Sublimed Naphthalene, Anthracene, Refined Tar, Pitch, also Sulphate of Ammonia.

For Prices apply to the **SOUTH METROPOLITAN GAS COMPANY,**

Works: ORDNANCE WHARF, EAST GREENWICH, LONDON, S.E.

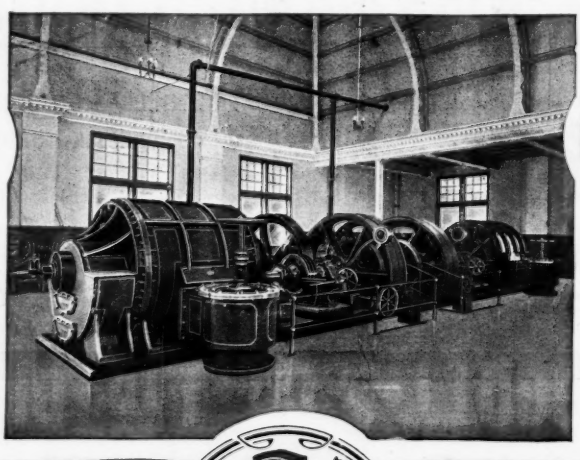
709, OLD KENT ROAD LONDON, S.E.

Telegraphic Address: "METROGAS, LONDON."

R. LAIDLAW & SON,

LIMITED

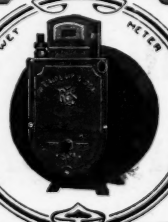
GAS & WATER ENGINEERS,



SIMON SQUARE WORKS, EDINBURGH.

6 LITTLE BUSH LANE, LONDON, E.C.

TWO EXHAUSTERS EACH TO PASS 750000 CUB. FT. PER HOUR AT 60 REVOLUTIONS PER MINUTE DRIVEN BY TWO GAS ENGINES

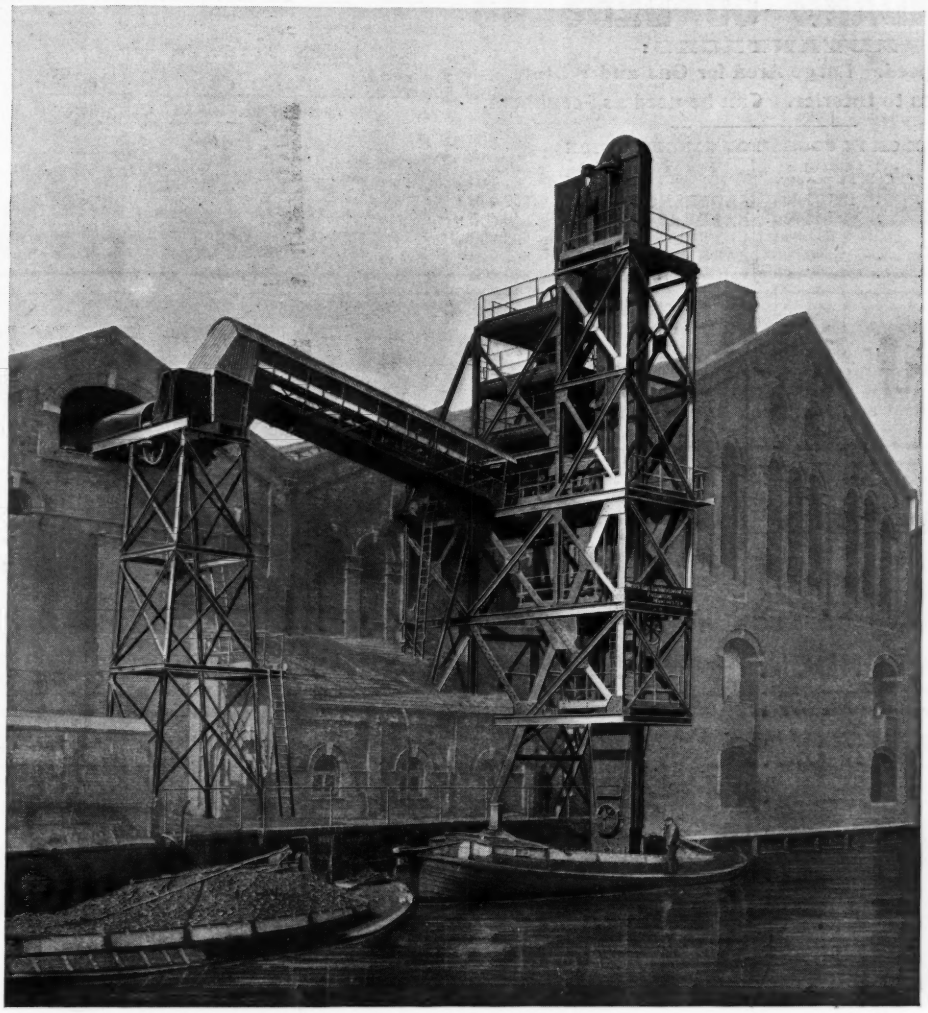


AND INTERMEDIATE FRICTIONAL GEARING, ERECTED AT GRANTON GAS WORKS FOR EDINBURGH & LEITH GAS COMMISSIONERS

ALLIANCE FOUNDRY & ENGINEERING WORKS, GLASGOW.

WEST'S GAS IMPROVEMENT CO., LTD.,

GAS AND GENERAL ENGINEERS.



PHOTOGRAPH SHOWING

West's Coal Handling Plant for unloading Barges, Elevating, Breaking, Automatic Weighing, Conveying and Storing the Coal in Stores.

STOKING MACHINERY SPECIALISTS

Over 140 Installations of West's Stoking Machinery now at work.

West's Patent Coke-Conveyors.
,, ,, Regenerator Settings.
General Structural Ironwork.

The Bournemouth Arch-Pipe.
Belton's Relief Apparatus for Hydraulic Mains.

ADDRESS—ALBION IRONWORKS, MILES PLATTING, MANCHESTER.

Telegrams: "STOKER, MANCHESTER." **Telephone Nos, 1339 & 5520.**

KIRKHAM, HULETT, & CHANDLER,

LIMITED

PALACE CHAMBERS, BRIDGE ST., WESTMINSTER, S.W.

Telegraphic Address: "WASHER, LONDON." Telephone No. 127 VICTORIA.

PATENT

"STANDARD" CONDENSERS

ADVANTAGES:—

Slow Speed. Large Area for Gas and Water.

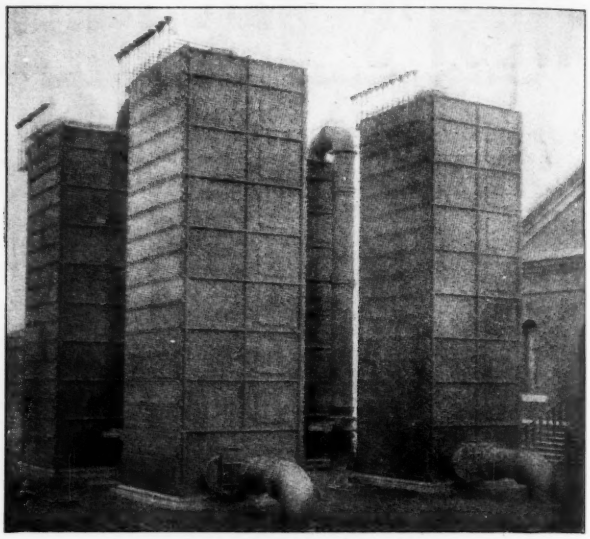
Easy access to Interior. Can be used as Scrubbers.

IN USE OR IN COURSE OF CONSTRUCTION:—

	Capacity Cub. Ft. per day.		Capacity. Cub. Ft. per day.
GLASGOW	12,000,000	ALDERSHOT	500,000
ANTWERP	2,500,000	RANDERS	500,000
COVENTRY	2,000,000	CETTE	400,000
COPENHAGEN	1,500,000	BARKING.	300,000
BURY	1,000,000	PINNER	250,000
SUTTON	1,000,000	HERNE BAY	250,000
GLOUCESTER.	1,000,000	PELTON COLLIERY	250,000
SCARBOROUGH	1,000,000	TUBORG	250,000
GUERNSEY	750,000	AALBORG	250,000

PATENT "STANDARD" WASHER-SCRUBBERS

See last and next week's Advertisements.



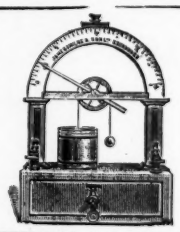
Patent "Standard" Condensers at Provan Works, Glasgow, 12,000,000 cubic feet per day capacity.

JAMES MILNE & SON, LTD.,

GAS ENGINEERS

MILTON HOUSE WORKS EDINBURGH.

LONDON. —— LEEDS. —— GLASGOW.



INSTALLATIONS OF INCLINED RETORTS COMPLETE.

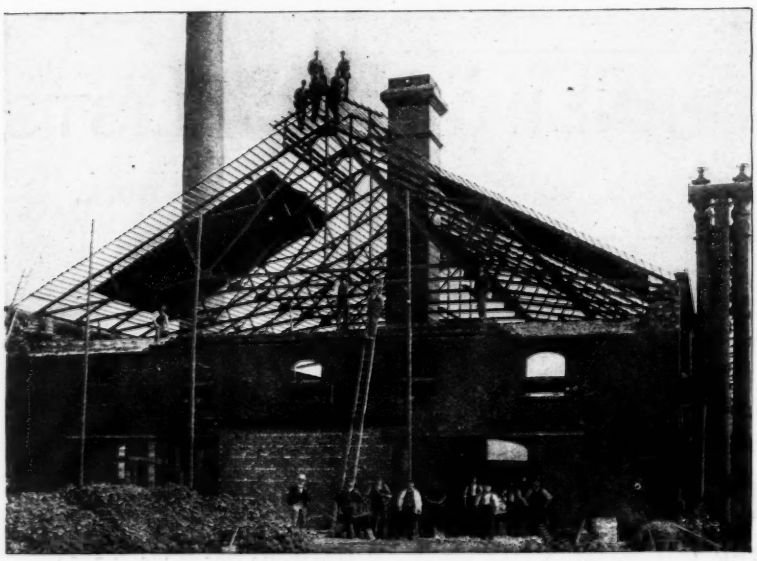
DRAKES LTD.

HALIFAX.

Telegrams: "DRAKESON, HALIFAX." *Telephone:* "No. 43 HALIFAX."

COAL AND COKE

BREAKING,
ELEVATING,
CONVEYING,
SCREENING,
PLANTS.



LONDON:
181, QUEEN VICTORIA ST., E.C.
NEW YORK:
395, BROADWAY.

Gas consumption

WITHOUT the **'Eureka'**

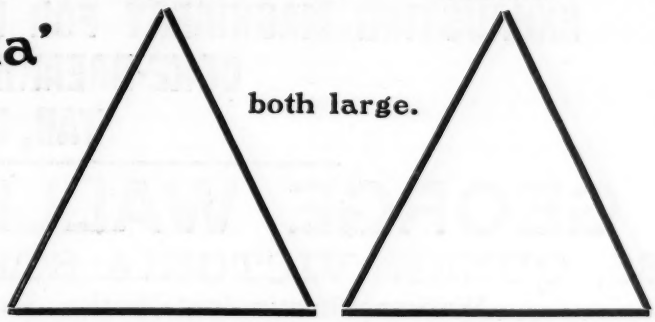
WINTER—Small. SUMMER—Very small.

Gas consumption

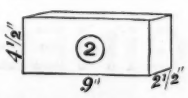
WITH the **'Eureka'**

on Hire.

WINTER and SUMMER both large.

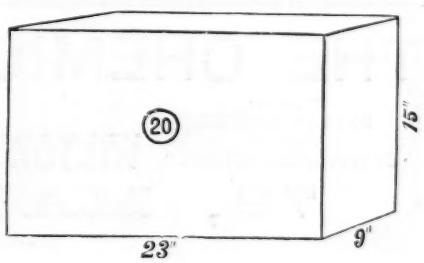


JOHN WRIGHT & CO., Essex Works, BIRMINGHAM.



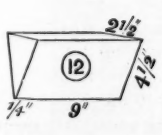
STEPHENS & CO.,

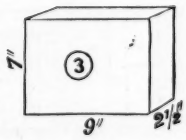
KIDWELLY.

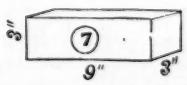


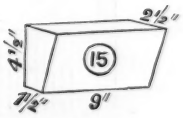
SPECIAL IMPROVED

SILICA BRICKS, BLOCKS, SHIELDS, TILES.









SPECIAL PLASTIC SILICA CEMENT.

Without doubt the finest Materials in the Market for Gas-Works Furnaces.

CONTRACTORS TO A LARGE NUMBER OF THE PRINCIPAL GAS-WORKS.

BRICKS, BLOCKS, TILES, & SHIELDS of any shape made to order.

EXHAUSTING MACHINERY.

Oldest Makers of High-Class Exhausting Machinery of all Capacities and for all Purposes.

WALLER'S PATENT 3 AND 4 BLADE EXHAUSTERS

Require less Steam and maintain a steadier Gauge than any other type.

OVER 1000 SUPPLIED.

WALLER'S PATENT "COMBINED" EXHAUSTING SETS FOR SMALL WORKS.

With Steam or Gas Engine, and all Accessories self-contained on one base plate. From 500 cubic feet to 10,000 cubic feet per hour.

SPECIALLY DESIGNED EXHAUSTER SETS FOR WATER-GAS PLANTS.

EXHAUSTING MACHINERY FOR BYE-PRODUCT PLANTS.

COKE-BREAKING MACHINERY.

TAR, LIQUOR, AND WATER PUMPS.

GEORGE WALLER & SON,

165, QUEEN VICTORIA STREET, LONDON, E.C.

Works: Phœnix Iron-Works, Stroud, Gloucestershire.

Telegraphic Addresses { London: "Weighbeam, London." / Stroud: "Waller, Brimscombe."

Telephone Numbers { London: 2420 (P.O.) Central. / Stroud: 210 Brimscombe.

Agents for Scotland: D. M. Nelson & Co., 53, Waterloo Street, Glasgow.

THE CHEMICAL ENGINEERING CO.

Telephone: No. 2639 AVENUE.
Telegrams: "EVAPORATOR, LONDON."

AND

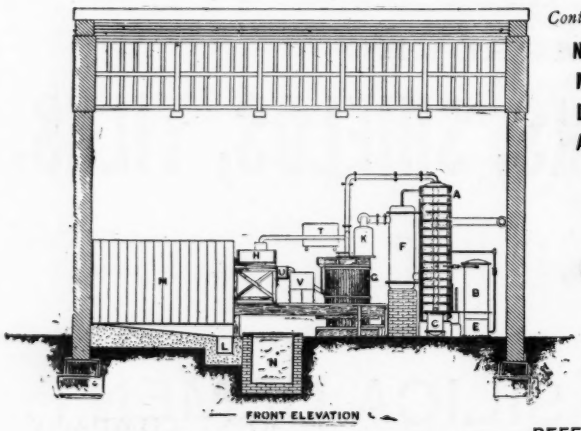
WILTON'S PATENT FURNACE CO.,

CROWN WORKS, ABBEY LANE, STRATFORD, E.

79, MARK LANE, E.C.

WILTON'S SULPHATE OF AMMONIA PLANT.

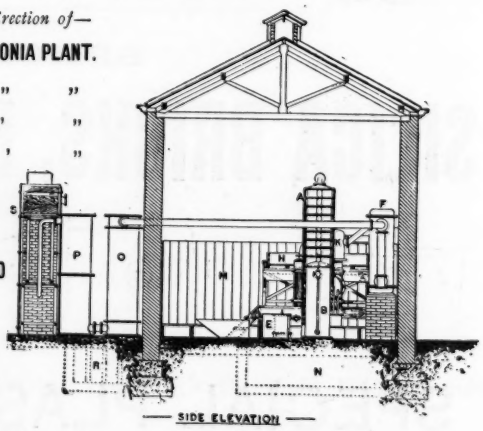
SIMPLE CONSTRUCTION. EASY MANAGEMENT. HIGHEST EFFICIENCY.



Contractors for the Erection of—

NITRATE OF AMMONIA PLANT.
MURIATE OF " "
LIQUID '880 " "
ANHYDROUS " "
TAR DISTILLATION PLANT AND SULPHURIC ACID PLANT.

CYANIDE PRUSSIATES. BLUES.



REFERENCES.

A. Large Still (Ammonia).
B. Small Still (Lime).
C. Spent Liquor Valve.
E. Limeing Arrangement.
F. Heater.
G. Saturator.
H. Draining Table.
K. Lead Catch Box.
L. Mother Liquor Well.
M. Sulphate Store.
N. Acid Store Tank.
O. Condenser.
P. Scrubber.
R. Settling Tank.
S. Neutralization Plant.
T. Acid Supply Tank.
U. Mother Liquor Trough.
V. Mother Liquor Receiver.

CONVEYORS and ELEVATORS SPECIALLY DESIGNED FOR THE ABOVE PRODUCTS.

Wilton's Patent Neutralizing Apparatus for the Waste Gases from Sulphate of Ammonia Plant.

CONTENTS.

EDITORIAL NOTES.

GAS, &C.—
A Plea for Means for the Higher Chemical Training of Junior Gas Engineers . . 625
The Departmental Committee on London Gas 626
The Quiescence of Labourism 626
The State of the Petroleum Trade . . . 626
The Law of Bankrupts' Gas Accounts . . 627
Mr. Long on the Valuation Bill 627
The Law of Ancient Lights and of Town Life 627
Fiction from Stepney—Coke Dust and Breeze and Inclined Retorts—The Indebtedness of Local Authorities—Pecuniary Interests of Councillors—Some More Satisfactory Results 628

INSTITUTION OF GAS ENGINEERS.

ANNUAL MEETING IN LONDON—
Inaugural Address of Mr. H. E. Jones, M.Inst.C.E., M.I.Mech.E. 630

ESSAYS AND REVIEWS.

Gas and Water Stock Market 639
The Earl's Court Gas Exhibition 639
The New Works of the Hastings and St. Leonard's Gas Company 640
Slow Combustion of Ethane. 645
Frederick Siemens: Pyrologist 645
Electric Lighting Memoranda 646
The Work of the Patent Office 646
Westenholz's Patent Automatic Gas Lighter and Extinguisher 647

COMMUNICATED ARTICLES.

The Conversion of Coke Dust and Breeze into Large Coke. By W. R. Herring, of Edinburgh 649
A Practical Test of Gas and Electricity as Sources of Motive Power. By Thomas Canning, Assoc.M.Inst.C.E. 649

TECHNICAL RECORD.

The Midland Association of Gas Managers at Nuneaton. 650
Yorkshire Junior Gas Association—Meeting at Hebden Bridge: Inaugural Address of Mr. W. Cranfield 653

CORRESPONDENCE.

Comparative Cost of Gas and Electricity . . 656
The Annual Picnic at Middleton 656
Coal and Water Gas from Vertical Retorts . 656

REGISTER OF PATENTS.

Conveyors—Little, A. J. S. B. 657
Charging Horizontal Gas Retorts—Gibbons, W. P. & G. B. A. 657
Treatment of Coke—Beaven, E. S. . . . 658
Incandescent Ceiling Light—Freudenthal, L. 658
Gas Washing and Scrubbing Devices—Kirkham, H., and Chandler, S. A. 658
Patent Notices 658

PARLIAMENTARY INTELLIGENCE.

Progress of Bills 659
Unopposed Bills Committee—New River Company Bill 659

MISCELLANEOUS NEWS.

Presentation to Mr. C. Crowther Smith . . 659
The Millennium Light 660
Birmingham Municipal Undertakings. . . 660
Edinburgh and Leith Gas Commissioners—The Question of Trading 661
Cheaper Gas and Higher Wages at Salford . 661
Bradford Corporation Gas Department . . 661
West Bromwich Corporation Gas Supply. . 662
Gas and Electricity at Stafford 662
Belfast Corporation Gas Supply 662
Coventry Corporation Gas Undertaking . . 662
Gas Profits at St. Helens 663

MISCELLANEOUS NEWS (*continued*)—
Smethwick Gas Department 663
Neath Corporation Gas Undertaking . . . 663
Wigan Corporation Gas Supply. 663
Reduction in Price at Newbury. 663
Tipperary Gas Company, Limited. . . . 664
Middleton Corporation Gas Supply . . . 664
Tunbridge Wells Electric Lighting—Further Trading Proposals Defeated 664
Lambeth Water-Works Company 665
Newport (Mon.) Corporation Water Supply—Completion of the Westwood Scheme . . 666
Notes from Scotland 667
Current Sales of Gas Products 669
Coal Trade Reports 670
Stock and Share List 672

PARAGRAPHS.

Water for Fire Extinction in London—The Late Professor Williamson—Chemical Manures in Italy—Reductions in Price by the Welsbach Company 629
Obituary. 639
Visit of Members of the Institution of Civil Engineers to America 647
Personal. 648
Dutch Association of Gas Managers . . . 649
Peat Gas-Works for Electric Power Stations—Waste of Gas in the Gas-Engine—"Fraud in Accounts" 655
Modernizing the Farnworth Gas-Works . . 656
New Water Supply for Lynton 658
Increased Storage at Darlington—Metropolitan Water Board 659
Westphalian Coal for the Paris Gas-Works—Widnes Water-Works Extensions . . . 660
Puttenham Water Supply—Gas Profits at Todmorden 662
Reduction in Price 667
Sales of Shares 669
The Stamping of Electricity Meters—Public Lighting of Plymouth 670

Messrs. HUMPHREYS & GLASGOW

AND

THE UNITED GAS IMPROVEMENT CO., U.S.A.

CARBURETTED-WATER-GAS PLANT

— *DOUBLE-SUPERHEATER SYSTEM.* —

H. & G., LONDON **150,200,000** Cu. Ft. Daily

U. G. I. CO., U.S.A. **423,600,000** Cu. Ft. Daily

TOTAL 573,800,000 Cu. Ft. Daily

Messrs. HUMPHREYS & GLASGOW,
38, Victoria Street, London, S.W.
31, Nassau Street, New York.

THE UNITED GAS IMPROVEMENT COMPANY
Philadelphia.

Telegrams {"EPISTOLARY, LONDON."
"HUMGLAS, NEW YORK."

THOMAS GLOVER & CO.'S

PATENT NEW IMPROVED PREPAYMENT METER

For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 6159 Bank.

THOMAS GLOVER & CO., LTD.,

GAS-METER MANUFACTURERS,

LATE OF CLERKENWELL, NOW 49, QUEEN VICTORIA STREET.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 6159 Bank.

BRISTOL:	BIRMINGHAM:	MANCHESTER:	GLASGOW:	BELFAST:	MELBOURNE:
28, BATH STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 1005.	57 & 58, BROAD STREET. *Telegraphic Address:* "GOTHIC"	132 & 134, CORN EXCHANGE BUILDINGS. *Telegraphic Address:* "GOTHIC." Telephone No. 3898.	26, WEST NILE STREET. *Telegraphic Address:* "GASMAIN." Telephone No. 6107 Royal.	8, EXCHANGE PLACE, DONEGALL STREET. *Telegraphic Address:* "GOTHIC."	23, WRIGHT'S LANE, LONSDALE STREET. Telephone No. 3716.

PARKINSON'S

WET & DRY

Gas-Meters.

GUARANTEED FOR

5 YEARS.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),

COTTAGE LANE, CITY ROAD, LONDON. | BELL BARN ROAD, BIRMINGHAM.

JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. LXXXVI., No. 2143.—TUESDAY, JUNE 7, 1904.

EDITORIAL NOTES—GAS, &c.

A Plea for Means for the Higher Chemical Training of Junior Gas Engineers.

A THOUGHTFUL and highly suggestive address was delivered to the Yorkshire Junior Gas Association by their President (Mr. W. Cranfield, F.C.S.) last Saturday; and it is a composition, embodying a plea, through which earnestness and conviction stand out with a clearness that draws one sympathetically to the side of the writer—if not on all minor points, on that which is the cardinal one. There are two things only which we regret in connection with the address; and these are that its message was not brought directly (as a paper) before the Institution of Gas Engineers at their meeting this week, and that—failing this—the deliverance was not made to the Yorkshire Junior Association at a time when the minds of gas men were not so largely occupied with their annual convention, in order to ensure that it should have the attention that it requires and deserves, in the interests of both the junior members of the profession and of the gas industry generally. But the plea which Mr. Cranfield sends forth in this address is one which is an appropriate and ably presented corollary to the claim which we urged some time since, on behalf of the juniors, that those in higher authority should do something more than in the past in affording the juniors facilities for fitting themselves for their life's work. The little agitation did a part in stimulating (not then through the general co-operation of the seniors, or under the ægis of the leading gas organizations) life among those who are training for higher positions in the gas industry, and in helping to bring about among them mutual intercourse and a desire to broaden the ground for the acquirement of knowledge and experience. Duty in advancing the good work appeals to us now to do all that in us lies to ensure that Mr. Cranfield's address meets the eyes of those who must take the active part in seeing that his conception does not live and die with the deliverance and publication of the address. We therefore refer to the matter in this section of the "JOURNAL," and ask for, and will with the greatest willingness publish, comments on the scheme from gas engineers and chemists identified with the industry; and particularly do we hope that the President and Council of the Institution of Gas Engineers will regard it as a subject worthy of their careful consideration.

The address touches upon several questions relevant to the main one; but we must leave the former in order to concentrate attention upon the latter. Indefinitely put for the moment, Mr. Cranfield urges that greater provision should be made for securing the higher education of the coming gas-works manager in the chemistry of his daily work; and the plan he proposes for realizing this is the crest of the case which he builds up in support of the cause, which is not his own, but that of the juniors and of the gas industry at large. And so he would have it regarded. A few sentences lifted from the address will place readers in possession of some—but far from all—of Mr. Cranfield's deliberate views on his present proposal. "In the pursuit of their technical "studies," he remarks, "two dangers loom up before our "students—the neglect of preparatory and allied subjects, "and insufficient work at them." The skilful and scientific management of gas-works plant "is largely a matter of "chemistry; and here, I think, we touch upon the weak "link in our chain of technical instruction." Old problems remain unsolved; and new conditions and new problems are arising. "Very many of these matters "centre upon chemical tests, and the secret of their "efficient handling is in the works' laboratory—the key to "much being gas analysis." "If in times past we had had, "as I hope to see in the near future, an array of trained "and well-informed observers at the various points, in works of all sizes and varying types of settings and plant, "does anyone imagine that so many of our outstanding "problems would still have been unsolved, or that we "should be bewildered, as we are now on some matters, by "the chaos of inadequate observations and seemingly con-"tradictory evidence?" There is, of course, but one answer to this; and the many gas men who have urged the want of a chemical laboratory and means for scientific investigation all stand out of the dead and fruitless past in this matter as supporters of Mr. Cranfield's charge of a grave neglect of a provision of vital consequence to the industry. The Council of the Institution of Gas Engineers are now moving to ascertain whether something tangible cannot be done, and that soon; and the deepest dishonour will rest upon the gas industry if a mere question of funds should cripple the Council to the extent that they fail to reach the object, so long desired and required, but so hard to attain. While he does not under-estimate the solid gains that would certainly accrue from the establishment of a central laboratory, Mr. Cranfield suggests that the more pressing need is the raising of a band of trained workers, and holds that greater and speedier advantages would follow, especially as then fuller and wider use could be made of the results obtained by the subsequent institution of research works. We should be loth to see the proposal for the immediate setting up of a central experimental works or laboratory abandoned, and equally should we be profoundly sorry to see Mr. Cranfield's idea crushed in the bud. It has been seen that he is deeply sensible of the presence of unsolved problems; for their solution, we cannot, if by any means it can be avoided, wait for the raising of a band of trained workers. On the other hand, it has been the absence of the general education in chemical investigation of gas men, that has brought about the accumulation of questions still shadowed by doubt and uncertainty. New problems are coming, and will continue to come, and with increasing rapidity, with change and progress; and it is this plain fact, and the experiences of the past, that form strong struts in our support of Mr. Cranfield's plea and scheme. But the arrears of old problems, and any new ones of the immediate future, must not be left in abeyance while investigators are being moulded.

But what is this scheme so earnestly advocated by the President of the Yorkshire Junior Gas Association? It is this—that, instead of isolated students of practical chemical testing pursuing their work under present cramped and unhelpful conditions, with comparatively meagre apparatus and occasional oversight and assistance, increased facilities should be given. He would form central classes in towns convenient of access; would equip them fully with all the apparatus to be found in the best works' laboratories and that of all varieties of types; and would place the classes in charge of gas-works chemists of high standing, or with such men to supplement the teachers on the regular staffs of the Local Technical Institutions. In the equipment and maintenance of such a centre, many could easily co-operate; and how, Mr. Cranfield tells in his inviting address. We do not, however, wish to explain the scheme too fully here, because its author does it so well that it is better the statement of his studied consideration of the matter should receive, in all its bearings, full and serious attention. Mr. Cranfield is a modest man; but the opportunity enables us to say that, as a teacher of gas manufacture in four Yorkshire centres, no one can be more capable than he of knowing the needs of the times. He has indeed found the "weak link" in the chain of the technical instruction of the young gas engineer; but if, in its strengthening, there should be a weakening of the engineering link, that would be a matter to be deeply deplored. The latter is a link that is not gaining so uniformly in strength as many would like to see; and, unintentionally, Mr. Cranfield in his argument puts his finger on the causes. It is so easy "to "call expert assistance to our aid;" and there are so many "firms of constructional engineers who can supply up-to-"date plant" without help from the gas engineer. There is no occasion, however, to impair other links by adding to the strength of the weak one; and therefore the proposed departure is one which all thinking gas men must assuredly welcome as a valuable means to a valuable end. What is

wanted is first the adoption of the scheme, or some other having the same purpose, by those in authority; and then the essential material assistance for its foundation. The gas industry would reap the benefits; and the gas industry would necessarily have to find the larger part of the means for obtaining it. There is the rub. It is distasteful to say it, but it is true, that past experience shows that, excepting in but comparatively few cases, the purse-strings of gas undertakings are rarely loosened for purposes that are for the general good. So much could be done if only the funds were forthcoming.

The Departmental Committee on London Gas.

DURING the past week statements appeared in some London newspapers purporting to give the gist of the recommendations made by the Departmental Committee of the Board of Trade on the quality and testing of gas supplied by the Metropolitan Gas Companies. Though the wording of this report betrayed the non-technical and unauthoritative origin of the intelligence—it was that "the lime test for sulphur "products in gas" should be abolished, nothing being said about the standard price or illuminating power—the news naturally aroused the keenest expectation in those who have waited so eagerly for the result of the inquiry. Garbled as the statement was, it bore the interpretation that the purification of London gas from sulphur compounds had been unfavourably pronounced upon by the Committee. Readers of the "JOURNAL," however, must take our assurance that, up to the time of this number going to press, all the reports received as to the nature of the Committee's recommendations were imperfect, misleading, and premature. It is quite true that the Committee have terminated their labours, which involved the taking and consideration of a great bulk of highly technical evidence, and have submitted certain recommendations thereon to the President of the Board of Trade. In this sense, therefore, it is correct to say that the report of the Committee has been presented to the President; but we were officially informed yesterday, on applying at the office of the Board, that Mr. Gerald Balfour had not then seen it, so that no authoritative communication of the report itself, or publication of the evidence, could be forthcoming, possibly for some days. Recognizing, however, the great importance of the subject, the Department will lose no time in giving the matter publicity; and authentic information will appear in the "JOURNAL" as early as possible.

The Quiescence of Labourism.

TIMES change. It is not so very long ago that questions of Capital and Labour bulked largely in every issue of the "JOURNAL." The reason for this was that the warfare of these opponents was active and incessant. It was impossible for any industrial organ to ignore the "alarms and "excursions" which the forces of Labour were indulging in on every side. It was not that we took any real pleasure in chronicling and commenting on these topics—far otherwise, indeed. Labourism became very tiresome before it was done with; and we are glad to be relieved, by the change of circumstances, from the task of discussing its vagaries. But the phenomenon of the silent disappearance of the usual article about Trade Union developments needs accounting for; and the satisfying explanation is not hard to seek. To put it shortly, the reason for the discontinuance by every technical journal and general newspaper of this kind of discussion, is no other than the healthful change effected in the character of Labourism by the Taff Vale judgment. Nothing else could have so quickly and signally cured the troublesome fever of Trade Unionism as this salutary warning that society lawlessness had run its course. For all the vapourings of professional Labour leaders about the necessity of safeguarding the sacred right of striking, and so forth, the experience of the country for the past few months has proved conclusively that the legal repression of Trade Union violence is an excellent thing. The exercise of power without responsibility was keeping all the trade of the country in a ferment, ostensibly for the good of working men, but really for the profit of their professional leaders. Now a welcome change has come over the spirit of the same individuals, and the community is marking quietly, but for future use, the fact that industries can get along quite well without a strike every alternate week. Each day of quietude that elapses renders it less easy to get up an effective parliamentary agitation for the restoration of the old state of things. Meanwhile, those who take a glance at foreign labour news can learn how the lack of the same steadying sense of amenableness to the law is keeping industrial affairs in a condition of unrest which may at any time produce the most serious consequences. Socialistic arrogance in some French ports recently went such lengths, in defiance of necessary discipline, that the ship's captains and chief officers struck against the domination of the seamen and firemen. In the United States, also, one branch of industry after another is being paralyzed by an absolute mania for strikes, which arise from the most trivial causes or none at all, and spread far and wide. In the circumstances, therefore, Englishmen may once more solace themselves in, and feel grateful for, the knowledge that there is a House of Lords! It is specially interesting to note, in this connection, that the Royal Commission on Trade Disputes has just taken the evidence of Mr. A. Beasley, the General Manager of the Taff Vale Railway Company, on his experience and views of Trade Unions in practice. The official statement of these proceedings in "The Times" last Thursday is highly instructive reading.

The State of the Petroleum Trade.

A CONSIDERABLE amount of interest of a kind was aroused in London commercial circles towards the close of last month, by the outbreak of a war of "cut-throat" competition between certain importers of Russian kerosene and other followers of the trade, mainly the Anglo-American Company. It is many years since the surface of the British mercantile system was disturbed by incidents of this character, which are more commonly read about as occurring in the Wild West, or other regions of the earth where trade has not yet come under the rule of decorum which prevails in English produce Exchanges. Naturally, the offer of tank truckloads of refined Russian petroleum at 2½d. per gallon is enough to cause large buyers to prick up their ears, and especially to make purchasers of gas oil wonder when the luck is coming their way. It is difficult to offer any observations to the purpose on this part of the subject, the circumstances of every case really regulating the possibilities of deals to such an extent that general considerations are mostly endued with abstract interest only. At the same time, manufacturers of carburetted water gas in this country are necessarily "intrigued" over what is going on in the import oil trade, and are concerned to know as much as there is to be gleaned about it.

So far as can be inferred from the reports which have lately been published—for obvious reasons it would be idle to expect to learn anything trustworthy from the inside—this is only another development of the forced policy of the Shell Transport interests. When the disappointing behaviour of the Texas oilfields threw the Shell Transport Company back upon their resources, Sir Marcus Samuel and the other heads of this vast concern did two things without losing any time—they consolidated the Asiatic petroleum trade on the Borneo source of supply, and they formed a new combination, called the General Petroleum Company, with the object of cutting into the British import trade in Russian oil. The latter seems to be intended, in this connection, to cover any oil which is not imported by the Anglo-American Company. The new Company was designed to distribute oil in competition with others now in the trade; and, as usual in such cases, those responsible for its operations started complaining to sympathetic newspaper reporters that the people in possession of the business were cutting prices in order to keep them out. Consequently, it was incumbent upon them, the new-comers, to do the same, only more so. On the other side, the Anglo-American people aver that the others began it. It is pointed out, in support of this contention, that for some years American kerosene has commanded a higher market price than the Russian product. This is notoriously true, and it has been the standing refutation of those perfervid enemies of the American Company who at one time reviled them, in a section of the Press, for dumping on the English market the refuse low-flash oil of Pennsylvania. Since the Fiscal controversy arose, involving a displacement of the indictment against the dumping of foreign produce in this country, this factitious impeachment of the Anglo-American Company has not been heard of. As a fact, if anybody has been dumping oil in English ports, it is the importers of oil of other than Anglo-American shipping.

To-day, if one can trust the newspaper quotations, the

more extravagant offers of kerosene have been withdrawn; Saturday's London prices being given as 6d. for American on spot, and 4d. to 5d. for Russian on spot. Even so, the shopkeepers must be having a very good time, for they are getting just the same retail prices as usual. The Anglo-American Company appear to be pretty comfortable in the circumstances, having bought a good deal of Russian oil cheap, which they can just as well afford to sacrifice as the others in the trade. How long the "cut-throat" order of competition will continue, it is impossible to predict; but it is pretty safe to entertain the opinion that the first to be tired out will not be the Anglo-American Company. Buyers of oil will be well advised meanwhile to get as much as they can out of the desperate struggle for the British market while it lasts. The oil trade is in so few hands that trustworthy intelligence concerning its courses at any juncture cannot be obtained. The manipulators allow just so much to transpire as they think fit. It may be a bad thing for the Shell Company if they do not succeed in obtaining the dominating position in the home market which they appear to have set out to acquire; but their failure will not greatly affect the consumer in the long run. In any case, the trade in gas oil seems to be outside the sphere of conflict. One would fain hope, for the sake of the gas industry, that the remarks of a London newspaper, not usually favourable to gas companies, are correct, and that all the importers of lamp oil are suffering from the dulness of demand attributable to the rapid supersession of oil by gas for most of the purposes for which a large proportion of the population has hitherto been in the habit of patronizing the oilman.

The Law of Bankrupts' Gas Accounts.

A FIERY protest has just been made in public prints in regard to an alleged arbitrary rule of the Leeds Corporation Gas Department, under which the Corporation refuse their assent to deeds of assignment executed by debtors, and demand payment of gas accounts in full, upon threat of cutting off the supply. Should the estate pass into the hands of a trustee with the object of completing any contracts in hand, the Leeds Corporation refuse to continue a supply of gas, water, or electricity, unless the outstanding accounts for these necessaries are first paid. This practice, of course, is denounced by outsiders as being no better than municipal blackmail. Noticing the matter, a London financial newspaper aptly recalls the recent experience of the Gaslight and Coke Company in the House of Lords. In the case of the Company, however, it was merely the amount of a gas bill that was at issue; and inasmuch as the debtor had vanished, and the incoming tenant had no need for the Company's services, the unfortunate Company found themselves powerless to profit by the remedy they imagined they possessed for just such losses, and their Act was reduced to the merest *brutum fulmen*. If the example of Leeds were followed, how much more would the householder and shopkeeper rejoice at the change from company to municipal trading! For it would be impossible for the occupier to escape from the liability to pay for the gas consumed by his predecessor in location, on the score that he only wanted electricity, seeing that both would come from the same quarter. On the point of law as it now stands, however, there is no uncertainty. Receivers in bankruptcy, official or other, are not new consumers. They are in the relation of caretaker, and in no better position as regards the gas company than the debtor. A trustee, however, has been held to be in the position of an incoming tenant ("Michael and Will," Fifth Edition, p. 83); so that if the Corporation of Leeds, or any other Municipal Gas Department, refuse to supply a trustee who will give the statutory guarantees for payment, unless he first pays the outstanding account, they are wrong. Some gas undertakings have in their Acts special clauses which deal with bankruptcy cases; but in the absence of these the law is as stated. There is something to be said for the public irritation against the growing tendency of local authorities to claim priority of payment for every claim of theirs, the same as for rates. It is doubtless difficult for a corporation department making trade debts to regard these differently from the rates which other departments are able to enforce, especially in places where the collection is in the same hands. While the exception of certain claims is retained, however, for reasons which are esteemed sound and salutary, it is necessary to exercise the greatest jealousy against their irregular increase.

Mr. Long on the Valuation Bill.

IN previous comments on the Valuation Bill, we have had to bear in mind the circumstance that no Ministerial explanation of the controversial points in the Government measure had been offered. Consequently, it was necessary to exercise reserve in criticizing these proposals, lest afterwards one should have to repent having wasted good indignation upon some mistaken reading of a draft which was still subject to revision. Last week, however, the President of the Local Government Board received two deputations —one representing provincial assessment committees and boards of overseers; and the other from some Metropolitan assessment authorities. The replies to these deputations cover several of the most salient objections made to the Bill. Mr. Long assured the committees that the Government had no intention of forcing the Bill down anybody's throat, but would listen to every suggestion likely to attain the object in view, which is to make the first step in the direction of reforming an unquestionably obsolete system. This step must be of a constitutional nature, and deal with authorities, powers, and machinery. It is no reflection upon anybody connected with the existing order of things in respect to assessment to say that there should be more uniformity and a better system for establishing the basis of rating. As we expected, the selection of the local authority as the new executive for assessment purposes is in order to bring this branch of public business into line with the rest. The President of the Local Government Board might have just arisen from the perusal of his "JOURNAL" when he said "he "believed that one of the difficulties of any reform of local "government in this country is the large number and small "character of many of our local authorities." The deputation could not find any direct fault with anything Mr. Long said to them on this or any other head of their objections to the Bill; but they went away and formed themselves into a Committee to organize opposition to the second reading. This does not seem to be a very hopeful policy. An opposition which has no amendment to suggest, merely wastes its time. As to the Metropolitan deputation, which chiefly protested against the unification of the rating arrangements of London under what some regard as the excessive supervision of the London County Council, the separatist demand preferred on behalf of the Corporation was summarily rejected. At the same time, Mr. Long was careful to repeat the assurance that the Government would meet any competent critics of the measure in the spirit of give and take. On the whole, therefore, the position has been cleared up by these deputations.

The Law of Ancient Light and of Town Life.

THOUGH the subject-matter of what is commonly understood by the term "ancient lights" does not specifically concern gaslight, but relates to windows, the circumstance of the House of Lords having pronounced a far-reaching judgment on the law of light is likely to be of interest to our readers, in their capacity of dwellers and workers in populous places. There are, indeed, few points of the many in which the law of England touches the proprietors and occupants of office buildings, and other structures which go to the rebuilding of towns in a better style, as to which greater trouble has arisen. One of the first things that the intending builder of a lofty town house or office building has to consider is the question of what "ancient lights" he is likely to affect by his proceedings. The same considerations result in the setting up over the whole country, by railway companies, gas companies, and other holders of land temporarily unbuilt on, of huge warning or protection hoardings, intended to prevent the acquisition by usage of an easement of light. Such boards, bearing the legend, "It is the intention of the "So-and-so Gas Company to erect a gasholder on this "site," may be seen in various localities; and of the need of taking such precautions there is no doubt. There is a case on record in which it was sought to enforce against a Gas Company a right to the free circulation of air over a piece of land which had either not been built upon, or had only been covered with low buildings, which the owners superseded by something more lofty. This was only a fantastic claim; but the right to light is serious enough. It is a point of law which would have delighted the heart of the immortal Captain Cuttle, inasmuch as the rights of it largely depend upon the application. In the case recently decided,

Colls v. Home and Colonial Stores, Limited, the latter party originally brought an action for an injunction to restrain the former, a builder and contractor from erecting loftier premises on the site of an old building opposite their own, thus obstructing their ancient light. The defence was, that the quantity of light that would remain would be sufficient for the ordinary uses of the premises for habitation or trade; and that if any injury were caused, the remedy lay in damages, not in an injunction. The Company refused to base their claim on a matter of damages, but insisted on their alleged legal right to an injunction. Mr. Justice Joyce, who heard the action, was of opinion that though the new building would deprive the Company of a substantial amount of light, yet this was proper matter for damages, not for an injunction to stop the building. The Court of Appeal reversed this decision, and ordered the pulling down of the new building to such a point that the ancient light enjoyed by the Company would not be in any degree diminished. Mr. Colls appealed to the House of Lords, where it was heard by a full House; and the decision was in his favour. Very remarkably, the exact question at issue had never been previously brought before the House. It was simply whether an ancient light is to be unobstructed, in the smallest degree, for ever. As the Lord Chancellor remarked, if this were the law, it would be very far-reaching in its consequences, and its strict application would prevent the growth of towns, and limit the rights of people to utilize their own land. It would go beyond the question of the rule of 45 degrees, which places buildings farther off than this line beyond the reach of the law. The Lord Chancellor went on to illustrate the question by referring to the access of air, and also to the conditions of a town atmosphere as to smoke or smell; concluding that the question of law is really one of degree, and of whether, in any particular case, what is suffered amounts to a nuisance which will give a right of action. No nuisance, no remedy; neither by action for damages nor for injunction. Partial inconvenience, even, is not actionable. Such a sensible judgment will be of enormous value, as a measure of relief from the pressure of claims which are not always meritorious.

Fiction from Stepney.

The Electricity Committee of the Stepney Borough Council have issued a "defence" of the extravagant method of lighting certain streets of the borough by electric arc lamps. We learn that the expense of arc lighting in Stepney to the extent dealt with is about £3065, as against something like £900 per annum under the old system of gas lighting. In extenuation of this extravagance, the Committee say: "Although the cost per lamp is far greater for electricity than for gas, the intensity of the electric arc lamp is more than twenty times as great as gas, and the cost per candle-power for an electric arc lamp is about one-third the cost of gas of the same candle-power." It is not supposed for an instant that the members of the Committee have, "off their own bats," promulgated this piece of nonsense. Someone has deceived them; and they, in turn, are trying to deceive the public of Stepney. But we hope the latter will not, without due inquiry, swallow the statements as being sufficient satisfaction for an annual excess expenditure of £2160 for lighting the streets now as compared with the old order of things. The Electricity Committee know full well, from experience in the borough, that the streets in question could be lighted quite satisfactorily by means of the incandescent gas-light at far below the £3065 which, we make out, is not the total sum paid for electric arc lighting by the ratepayers. The annual cost of an arc lamp in Stepney, including current and maintenance, is about £27 14s.; and as, from information recently given, there are about 260 such lamps in the borough, the annual total expenditure on them must be something like £7200. But this by the way. The points to be met in the statement is that the electric arc lamp has an intensity twenty times as great as gas; and the cost per candle-power is about one-third the cost of gas of the same candle-power. This is rich. If the intensity of the electric arc is more than twenty times as great as gas, how is it the cost per candle-power for the electric arc is only one-third that of gas? We are not going to harass our brains in trying to solve the mystery. It may, however, be pointed out to the Electricity Committee that there are several high-power incandescent gas-lamps on the market, from which 900 to 1000 candles per lamp can be obtained at an expenditure of 30 cubic feet of gas an hour—that is, 1d., or less, per hour. Suppose that the lighting hours of Stepney are 3940 per annum, the cost would be £16 8s. 4d. at 1d. Even supposing the cost of maintenance absorbs the difference between this figure and £20 per lamp, this would mean a saving of £7 14s. on the 260 electric arc lamps in the borough, or £2000 a year. This being so, what becomes of the absurd assertion as to the "twenty times" more intensity and the "one-third" less cost? Besides, it is a moot point whether Stepney is getting anything like 900 or 1000 candles from the electric arcs.

Coke Dust and Breeze and Inclined Retorts.

In another column, Mr. W. R. Herring directs attention to one of those "wrinkles" in gas manufacture which may or may not be the germ of future development of great importance; but it promises well. It had its origin in a suggestion that a small percentage of breeze should be mixed with a particular class of French coal as a preventive of slipping in a new installation of inclined retorts at a gas-works near Paris. Mr. Herring does not name the works; but it is easy to locate them, seeing that a member of the "JOURNAL" staff has recently been to the same place. The idea, it is believed, emanated from Mr. W. B. Leech (of Messrs. Graham, Morton, and Co., Limited), and the credit, if any eventually attaches to it, of carrying the idea into practice, and ascertaining the best percentage of breeze to use for this special object, will be the due of M. L'Homme, the Manager of the Nanterre Gas-Works. As a consequence of the experiments, it is asserted that an admixture of 5 per cent. of coke dust and breeze with the coal in question has completely overcome the difficulty; and certainly nothing in the nature of slipping was noticed on the occasion of the visit referred to. In this there is a simple experiment for those who may have similar difficulty; and perhaps they, too, will find the idea efficacious. The purpose for which this admixture was made does not, however, concern Mr. Herring, as wayward charges have not come within his large experience of inclined retorts. But it did impress him as being a means of turning coke dust and breeze into a residual of higher value. He has experimented, and finds that 5 per cent. of coke breeze can be intermixed with common coal and 15 per cent. with a strong caking coal (comparable with Newcastle and Durham coals) without impairing the quality of the coke made. This is highly important when one remembers the hillocks of breeze that are frequently seen in gas-works, and which many a manager finds it difficult to profitably dispose of. Of course, for the express purpose of converting breeze into the more profitable coke, horizontal retorts would be equally as effective as inclines. It is found by our correspondent that intimate mixing and careful proportioning are indispensable conditions. Mr. Herring is now going a step further in his investigations, as, from his experiments so far, he has reason to believe that the intermixing of coke dust in caking coal facilitates the passage of the gas from the mass. If this is so, it will enable a heavier charge to be worked off in the same period of time. It is hoped by Mr. Herring that engineers in different parts of the country will experiment with coke dust and breeze in all three directions with various classes of coal; and, whether the results are good or indifferent, we shall be pleased to publish them.

The Indebtedness of Local Authorities.

In the "JOURNAL" for the 24th ult., we dealt with a return then just published, in compliance with an order of the House of Commons, made on the motion of Mr. John Ellis, showing the indebtedness of a number of boroughs (other than those of the Metropolis) in England and Wales on March 31, 1903. It may be remembered that it was then stated that Mr. Ellis intended to ask the President of the Local Government Board, on the re-assembling of Parliament after the Whitsuntide recess, if he would supply the grand totals, which were wanting in the return. The required information has now been furnished; and we give it, so as to complete the particulars which have already appeared. They included some totals circulated by Mr. P. S. Bridgeford, the Secretary of the Industrial Freedom League; but they differ slightly from those supplied by Mr. Long. These show that the outstanding loans in respect of gas-works, water-works, &c.,

amount to £114,310,427; and those relating to other works and purposes to £80,700,022. The overdrafts on bankers on capital account come to £7,233,548; on revenue account, to £3,479,505. The total of the column showing the outstanding loans and overdrafts is £205,731,307. The amount standing to the credit of sinking funds is £11,960,956; and that remaining due to Councils in respect of loans raised to advance to other local authorities, £2,987,880. The total estimated value of corporate property is £241,135,270; the assessable value for purposes of the borough rate being £64,798,316, and the value for the purposes of the district rate £61,409,825.

Pecuniary Interests of Councillors.

The discussion in the Tunbridge Wells Town Council last week on a proposal that the Electricity Committee should obtain statutory powers to enable them to widen the scope of their business, was the means of bringing into some prominence a variation of a question which has already arisen in innumerable other places—namely, the right of the shareholders in the local Gas Company to take any active part in the proceedings. In this instance, however, to be forewarned was to be forearmed; for the Mayor having been asked in committee what his ruling would be with regard to gas shareholders voting or speaking, announced early in the discussion that he had asked the Clerk to take Counsel's opinion on the subject. This had been done (the gentleman consulted being Mr. A. Macmorran, K.C.); and the Town Clerk read to the meeting the opinion he had obtained, which has since been published in the "Municipal Journal." Mr. Macmorran stated that, although the point had never been expressly decided, there had been a general consensus of opinion to the effect that, on the question whether electric lighting should be introduced, the shareholders of the local gas company were disqualified to speak or vote by section 23 of the Municipal Corporations Act of 1882. He found that he had so advised on a previous occasion, on the ground that the introduction of a rival system of lighting, for public and private purposes, must be regarded as affecting the pecuniary interest of the gas company and of every shareholder in that company; and opinions to the like effect had been given at various times by the present Lord Chief Justice, Mr. Justice Wright, and Mr. Asquith, K.C. He thought that the same principle applied where the question was whether powers should be sought which were avowedly for the purpose of competing with the gas company, and that consequently, on the particular question then to be discussed by the Town Council, an alderman or councillor who was a shareholder in the Gas Company could not speak or vote. This opinion—though it, of course, made clear the position of the Mayor and those members who hold shares in the Tunbridge Wells Gas Company—did not affect the result of the deliberations; for a majority of the non-gas proprietors on the Council disapproved of the Electricity Committee embarking on free wiring and the supply of motors, &c., on the hiring system, and the proposal therefore came to nought. Mr. Macmorran's statement is, however, interesting to record—referring as it does to a discussion with regard to an undertaking already in existence, and not to the mere matter of deciding whether or not the supply of electricity should be taken in hand by a local authority.

Some More Satisfactory Results.

This week there fall to be noticed quite a number of reports of the working of corporation gas undertakings during the past year; and their extremely satisfactory nature makes them very pleasant to peruse. There is record breaking to be found in all directions. In Birmingham, for instance, the gross balance was £185,577, which was the largest experienced since the Corporation acquired the undertaking; and though the income from gas showed a decrease of £21,600 (due to the lower prices charged during the last six months of the year), there was in reality a net profit of £63,745. At Stafford, all previous records at that works have been beaten with regard to the make of gas per ton, sale per ton, leakage, proceeds of residuals per cent. on cost of coal, quantity of gas sold, and gross profit. The make per ton was 10,632 cubic feet of about 16½-candle gas, the sale per ton 10,165 feet, the leakage 3·14 per cent., the net proceeds of residuals per cent. on the cost of coal 78·7 per cent., the quantity of gas sold 171,767,442 cubic feet, and the gross profit £12,232. The St. Helens Gas Committee regard the result of the past year's working as very satisfactory, though the total quantity of gas made did not show the 10 per cent. increase to which they have been accustomed. There was, however, a substantial growth of 4 per cent.; and in view of the rising rates, the Committee are handing over to the borough fund £5000, which is a much larger amount than was contributed the previous year. A rise of 4·27 per cent. in the aggregate sales of gas is reported from Smethwick, where the receipts increased by £2746, and the expenditure by only £239. This resulted in a net profit of £5921, which was an increase of £2431 over the previous year. The make of gas at Wigan was 425,319,000 cubic feet, or 6,803,000 feet more than in the preceding twelve months; while the quantity sold by means of prepayment meters increased to the very large extent of 44·39 per cent. In fact, nearly the whole of the extra consumption was taken by this class of consumers. The yield of gas per ton of raw material was at the rate of 11,371 cubic feet; and there was a balance of close upon £30,000 to go to the profit and loss account. The gross profit for the past year on the Bradford gas undertaking was £71,927, or £12,700 more than the previous record; and in place of the deficit of £1180 which was experienced on the last occasion, there is this time a net profit of £9916. Considering the general depression which exists in all branches of trade in the town, the increase of 2 per cent. in the total quantity of gas sold cannot be regarded as otherwise than gratifying. Various concessions to the consumers are to be made at Newbury, in consequence of the flourishing condition of the gas undertaking—the past year's profits having been the highest ever made.

Water for Fire Extinction in London.—The quantity of water used for the purpose of extinguishing fires in the County of London last year, according to an official return recently issued by the London Fire Brigade, was 27 million gallons, or nearly 120,536 tons. Of this quantity, about one-quarter was taken from the river, canal, and docks, and the remainder from the street-pipes—this being supplied free.

The Late Professor Williamson.—At the opening of the meeting of the Chemical Society on the 28th ult., the President (Professor W. A. Tilden, D.Sc., F.R.S.) said he thought it would be consonant with the wishes of the Fellows if he gave expression to the deep feeling of regret with which they had all received the news of the death of one of the most eminent of their Past-Presidents—Professor Williamson. A man of philosophic mind and great intellectual activity, he had been led in the later years of his life to abandon research in connection with chemistry in favour of other pursuits. Hence it was difficult for chemists of the present generation to realize how great had been the influence exercised by his experimental researches and his writings on the progress of theoretical chemistry forty years ago. Williamson served the Society during many years on the Council, as Vice-President, and for two separate periods as President.

Chemical Manures in Italy.—The "Bollettino Ufficiale del Ministero d'Agricultura, &c.," publishes a report on the consumption of chemical manures in Italy, drawn up by the Professor of Agricultural Chemistry at the Royal Technical School of Milan. The following particulars are extracted from this document: The most widely used chemical manures are superphosphates. The annual consumption of these is about 4,000,000 quintals (quintal = 220·4 lbs. avoirdupois), mostly manufactured in Italy. The importation from the United Kingdom, France, and Belgium is very slight. For various reasons, scientific agriculturists have not availed themselves of nitrate of soda so much in Italy as in other countries. Its use is, however, becoming more general. In 1903, 200,000 quintals were consumed, the whole of which came from Chili. About 125,000 quintals of sulphate of ammonia are used annually; the major portion coming from the United Kingdom. Only one-third of the amount consumed is produced in the country.

Reductions in Price by the Welsbach Company.—The General Manager of the Welsbach Company (Mr. L'ce Fletcher) has issued a circular notifying reductions in price for both mantles and burners; and, following their own precedent, the Directors are giving the trade an opportunity of clearing out present stocks before any announcement is made to the general public. Regarding mantles, special attention is called in the circular to the fact that last season a Welsbach mantle was put on the market with Plaissetty improvements. This was at first priced at 4½d. to 5d. to the trade; but, by November, having modified the manner of production in the interval, a reduction to ordinary Welsbach prices—4d. to 4½d.—was made. The sliding-scales regulating the price of Welsbach mantles have now been materially altered; and the retail trade is in a position to buy Welsbach mantles in one gross lots at 4½d. each, or in seven gross lots at 4d. each; while the price to the public will be 6d. per mantle, or 5s. 6d. per dozen. As to burners, all types have, broadly speaking, been reduced by 2d. each.

THE INSTITUTION OF GAS ENGINEERS.

ANNUAL MEETING, JUNE 7, 8, and 9, 1904.

INAUGURAL ADDRESS OF THE PRESIDENT,

Mr. H. E. Jones, M.Inst.C.E., M.I.Mech.E.

The chair, which by your favour I occupy to-day, of the newly-joined Institutions, imposes at once upon me a grave responsibility and a great distinction; for the two Associations now so happily united may fairly claim to include nearly everyone holding a position of influence in the technical administration of gas undertakings in the kingdom. Not less than any must your President be anxious that the interests of the Institution should suffer in no wise from his own inadequacy. He would be a strong man indeed who did not feel some sense of misgiving in realizing what an opportunity is afforded by this large gathering for securing its interest and attention to the most important problems which concern the policy of our work and profession.

In the first place, it is my duty to point out in all earnestness that it is not by the efforts of President, Vice-Presidents, or Council, but from the individual and collective initiative of the members themselves that there must be drawn the force and the vitality that will give that life and scope to the Association which will place it at its true level of usefulness and importance among kindred scientific societies. So that there must be no remission of your several efforts to raise and uphold the due status of the Institution, the membership of which should stamp your walk in life with its certificate of competence—nay more, with its distinction. This cannot be accomplished without your contributions of interesting individual observations and experiences, nor without your own constant regard to a high ideal of personal and of professional obligation.

Our Field of Work.

Our calling discharges so great a public service in relation to the domestic and commercial needs of the people, that it comes second only to the supply of water; for light and heat may, by modern habits, be regarded as necessaries of life. Some measure of it may be formed by a consideration of the returns to Parliament for the United Kingdom of the year to Christmas, 1902, which show that £113,000,000 of capital earned £6,378,400 of profit, and that over 14 million tons of coal and other materials were used. Some 148,000 million cubic feet of gas were sold; there were 29,150 miles of main, serving 4,198,725 consumers (representing, probably, 25 million people); and 630,000 street-lamps! Such are the habits and customs of Metropolitan consumers, that of this great business the three London Companies and the three most important Suburban Companies together account for not less than 43,000 million cubic feet, or 30 per cent. of the total. There needs no argument, therefore, that the central office of the Institution should be in London, though, apart from this consideration, its superior accessibility and its possession of the Houses of Parliament, the Law Courts, and the Stock Exchange give great claims of convenience to a London Office. Paris (another Metropolis) is said to consume as much gas as the whole of France outside. As to the security of our large share of the useful work of the country, at this moment gas, which, twenty years ago, was threatened, as to its lighting, to be absolutely superseded by electricity, still retains 630,000 public lights throughout the kingdom—many of them in areas where the electric lighting is in the hands of the public authorities. They are kept there by the invincible logic of superior efficiency and cheapness. Further, we keep in hand the bulk of the indoor lighting. Steam is now everywhere giving place to gas, not merely in the shape of producer gas, but mostly by ordinary lighting gas. No limit can be put to this development, especially in view of the steady and persistent reduction in the selling prices of gas. Moreover, in all directions fresh applications are being made in the arts and manufactures of fuel in the gaseous form rather than in the solid or liquid shape.

If the commercial field of development of our industry be so considerably enlarging in extent and importance, on the other hand the scope for our engineering capabilities is not lessening in the slightest degree. Everywhere the double incentive of getting nearer to the main avenues of the supply of material, and the localizing of factories away from the population, is driving us to plan out new works on the seaboard or on the banks of navigable rivers, where, necessarily, the installation of heavy buildings and deep tanks and wharf walls presents special difficulties in connection with foundations and the execution of works below the water-line in unstable diluvial deposits. Modern operations depending on gravitation demand loftier buildings, most of which have to be fire and explosion proof; the largest of them have to endure great ranges of temperature; while the storing of gas on the scale now necessary involves the erection of gasholders of millions of feet capacity, which, of necessity, must be moderate in weight, while, on the other hand, their dimensions and position expose them specially to the wind.

Notably, those who are acquainted with the works built on the sea-shore at Portslade by Mr. Paddon, will realize the truth of the claim he made, in a paper written for the Institution of Civil Engineers, describing these works, in 1874, that some of the problems forced upon the constructing gas engineer were as complex and as important as those besetting any other branch of engineering. Having on occasions seen how destructive the south-west gales were upon the beach formation arranged to protect these works, one cannot withhold one's sympathy and admiration for the courage and ingenuity by which this veteran engineer "planted his footstep in the sea." By the way, we owe to him the rotary washer, the dry governor, and other useful inventions. Hardly less difficult, and not less boldly confronted, was the construction of the large tanks and holders of the East Greenwich works on the banks on the Thames, where a holder of 5 million cubic feet capacity has its tank in the silty deposits of the bank of a river, and rears no less than five telescope lifts to the storm.

Most of us have realized what difficulties arise in the construction of tanks and the erection of gasholders, on such scales as are now necessary and on such foundations as are found on the seaboard and the banks of the larger rivers, where works have now to be installed and where they have to bear the brunt of the unbroken gales which from time to time sweep our shores, estuaries, and valleys, and have so often exacted their tale of havoc on apparently much more substantial and less susceptible structures—such as the Tay Bridge. Again, we have to contend with the destructive action of the intense heats to which our carbonizing plant has to be raised for the effective treatment of the materials, whether in coal or water gas manufacture; while all our important buildings have to be both fire and explosion proof. Jetties, wharves, and docks have to be constructed; few works of importance are without both high and low level railways, worked by means of locomotives. Then hydraulic plant needs to be installed for dealing with coals or the moving of ponderous parts of our plant. Tunnelling for mains under dock entrances, rivers, and canals has to be undertaken. In quite small works now the economic production of steam at pressures not dreamt of 30 years ago, and its subsequent efficient application in motors, have to be studied. Steam-driven mechanical tools and appliances for elevating and conveying materials are common; while some stoking machinery is operated by compressed air.

That the work of both the civil and the mechanical engineer is required, is thus sufficiently demonstrated. If we consider that he deals with a gaseous product of varying density separated, sealed by, and stored over, liquids of different gravities, like tar, ammoniacal liquor, water, that the temperatures are widely different at the various stages, and, further, that this product has to be distributed in adequate bulk and at due pressures over wide areas of many elevations, it will be seen that there must be the qualifications in some degree of the physicist.

This does not complete the burden, for the whole of the

process for which the works he has laid out are operated requires a constant observation and controlling of temperature, and of the combining affinities throughout the separation of the gas from its residual products, its purification, and its proper combustion, such as can only be well done by one having considerable general acquaintance with chemistry.

Further, if he is to maintain the due competition with electric lighting and to deal with the serious injuries his distributing system may incur from stray currents of electricity, he must give some study to that science. Manifestly, therefore, there must be many sides to the qualifications of the competent gas engineer, and no little ground for the claim Mr. Paddon made.

Training.

It will befit the Council of this Institution to foresee and provide for facilities to be afforded to the rising generation to attain to this competence; and in this connection you will be glad to learn of the recognition given to the Institution by the Council of the Institution of Civil Engineers, who, in forming a Committee to deal with the question of the training of the young engineer, invited your Council to send a representative to the Committee, which resulted in your President being nominated. The Chairman, Sir W. White, is dealing with the subject in masterly fashion, covering the necessary theoretical instruction, but keeping in view the value of practical training.

But the reflection will arise that we have all in our early experience—and some of us later—duties of administration of the manufacturing and commercial side of the business of a gas undertaking, which tend, by their pressure, to divert our attention partly, and in cases almost exclusively, from the engineering and technical sides. In modern times more especially, the man of science must merge in the man of good administrative business qualities, and though less congenial, he must cultivate good commercial methods and systems of buying and selling, contracting, and even advertising. A marked feature of the present epoch is the advantage derived from show-rooms, exhibitions, canvassing, and lecturing to illustrate the varied uses of gas. A past generation would have regarded these with dislike—not to say contempt—as mere shopkeeping.

But the necessity for, and the advantage of, bringing under the notice of all classes the many applications of gaseous fuel to the arts and manufactures, and still more to the convenience and comfort of domestic life, cannot be ignored. Perhaps nothing has contributed more to the cheapening of the supply of gas for all purposes than the spread of domestic uses, which, in populations of the middle and lower classes, so usefully employs our manufacturing plant and distributing systems during daylight hours of midsummer, to the levelling-up of the hourly, daily, and annual load-factor, and to the dispensing with additional cost for storage and arterial mains. In this connection, you will see that your Council are arranging for an important exhibition of a very comprehensively illustrative character.

The field is clearly wide enough to warrant the attention of a competent civil and mechanical engineer; and it is much to be desired that the remuneration attached to the appointment will also be competent to the social standing, the education, and the proper training of such a one. One cannot but remark on the unsatisfactory and inadequate nature of the emoluments too often afforded to the responsible and laborious services entailed. To a large extent the blame for this rests on ourselves, for accepting positions such as are constantly offered in the advertisement columns of our technical journals, illustrations of which have been collected. But, nevertheless, a large amount of blame rests on those—chiefly committees of corporations—who seek to get the entire services of a competent and zealous officer for such a salary as no successful contractor would give to his leading foremen.

In the same column, £300 per annum is offered for the technical administration of a works which must turn out 4 or 5 million feet of gas a day, while as much as half this remuneration is offered for an outdoor inspector where the output of gas is only 300,000 feet per diem; and, further on, a salary of £400 per annum is attached to a purely clerical office where the output is 2 millions per diem. Even greater disparities between duties and rewards can be found in some of the smaller appointments, where, although the output is small, considerable qualifications are demanded, and where there is no assistance given in the way of a consulting engineer. This address will not be given in vain if it causes our members from their own side, and committees and boards of directors from the other, to give effective thought to the matter.

We have seen that the gas engineer needs the equipment and training of an engineer in the broadest sense. But what do we mean by an engineer? A Yankee has pithily said "An engineer is one who does that for me for a few pence which I could not do for myself for a shilling." This, though witty, is somewhat indefinite.

The Engineer.—Originally the man who made roads, bridges, mines, moats, tunnels, catapults, and ballisters was a soldier. "When grew the arts of peace," a civilian took up the work, and, in deference to the prestige of his militant predecessor, described himself as a "civilian engineer." This became shortened to "civil engineer." Nevertheless, though styled "civil," he is to-day more necessary to "the arts of war" than ever, as he equips the soldiers of all arms with weapons of precision, light and heavy, with means of transport, from the bicycle to the locomotive; and he provides the sailor with similar fighting arms, and with machinery for war ships of extreme variety and on a colossal scale.

If we seek to learn what are his functions, we find them described in terms at once clear, comprehensive, and dignified in the charter of the oldest and most important association of engineers in the world—viz., the Institution of Civil Engineers—as being "the art of directing the great sources of power in Nature for the use and convenience of man, as a means of production and of traffic." As Sir William White pithily told the members and guests of the Institution of Mechanical Engineers on a recent occasion, this description will cover every variation and specialization in the field of engineering. Surely we, who direct the natural resources existing as coal measures to the production of light, heat, power, and materials for fertilizing, colouring, and sanitation, must clearly consider ourselves brought within that inspired definition.

Specialists.—Specializing as between the engineer employed on railways, roads, and bridges, shipbuilding, docks, engines and machinery, water, gas, electricity, ordnance, and hydraulic power, is, after all, only branching from one essential stock, which must be that of mechanical engineer. He is, so to say, the bedrock from which all other special practicians must start. Without his aid the tools and implements employed—whether simple as the spade, or complex as the steam navvy for the heaviest earthworks—cannot be furnished. Nor can the instruments of extreme accuracy and precision, used in plotting and surveying and laying out works such as are involved in dealing with great distances and spaces by the civil engineer, be obtained. Neither can navigation be safely undertaken without his compasses, chronometers, sextants, and other implements; while the whole of the ship, as now built and propelled, is his work. Hardly a single manufacture can now be carried on without his engines, his mills, looms, spinning appliances, and machinery for every sort of process. Certainly we gas engineers are indebted to him in modern days for providing us with means for supplementing, if not for dispensing with, human labour in every branch of our process.

The physicist and the chemist must rely upon the delicacy of the balances and gauges that he alone can prepare. Thus the mechanical engineer may claim that the whole range of arts and manufactures relies upon him; for even the sculptor's chisel, the graver's tool, and the painter's brush, are only made with his help. While he monopolizes the special field of machinery, he furnishes every other specialist with his instruments and implements, machines and motors, whatever they be. Again, the mechanical engineer dominates in all means for obtaining power, whether from wind, waterfall, steam, or gas, and, further, in the transmission of that power by such means as hydraulic pressure, compressed air, electricity, wire ropes, or belting and shafting. Locomotion and transport of every kind depend upon him. Therefore the training of the mechanical engineer is clearly essential, without exception, to all engineers, and not least to the gas engineer. For him, too much importance, in proportion to its value, is often attached to the study of chemistry. No doubt that science is very attractive, as it opens the door to many mysteries, ever reveals some fresh combinations or further subdivisions. Its paths explore realms of research of enormous interest. But such is not the work of the average worker, and fits only the devotee of pure science who, seeking after abstract truths, scorns all suggestion of profit by the

practical application of his discoveries. Like that of physics, it must be pursued in moderation by practical men as an aid, not an end. No better study can the gas engineer have than that of mechanics. This is best attained by thorough practical working experience in the workshops, followed by the drawing office. A sound, general education must be acquired before this stage; and after the shops have been passed, a higher theoretical training should be got through local or university extension classes before seeking the acquisition of a general or special experience about works as inspector, resident engineer, or assistant to the chief. Throughout the whole of this time, enlistment successively in the ranks of pupil, associate member, and member of Institutions like our own, would tend to put form and direction into the training. When thus qualified, our engineer is ripe for almost any field, and will soon grasp the levelling and surveying necessary for railway, drainage, canal, docks, harbour, and mining works. It is hoped, however, that the less ambitious, but not less useful, career of a gas-works constructor and manager may attract him.

The Gas Field; Interesting and Attractive.

Surely its developments and variety will be interesting enough; and, on the whole, the remuneration is not to be despised. If he observe and consider the conditions of the gas industry, he will see that, so far from being superseded by electricity in its sole original field of lighting, it is driving back the small invasion made a few years ago in street lighting, and is keeping it at bay in internal lighting; so that we now have electricity pushed chiefly for traction. Sir W. Preece has responsibly advised the Local Authority at Maidstone that the Welsbach gas-light is best for the streets; and the "Journal of Gas Lighting" showed, in a recent article, that 71,000 out of 76,000 street-lights in the London area remained to the gas, though we all know the desperate efforts made to establish electricity in its place, and how, with this view, some corporations have been induced to jeopardize the rates by themselves undertaking electricity supply, and that with, in most cases, the worst financial results—*vide* the Marylebone muddle. The last parliamentary return, dated 1902, shows that the total capital expenditure on electricity supply undertakings amounted to £25,897,310, yielding a profit, without depreciation, of £1,025,665; the undertakings of municipal bodies not meeting the charges for interest and sinking fund by £103,000, without charging any depreciation.

But the most startling realization, even to the progressive gas engineer, is that gas is rapidly and surely displacing steam, owing to the great improvement in engines depending on the combustion of gaseous fuel within the cylinder, and spending the expansive force so generated on the face of the piston, which, in most types, is linked directly to the crank of the main shaft.

Looking to the facts at the present moment that English makers, though chiefly engaged on small motors from 10 to 50 horse power, nevertheless produce many engines up to 600 or even 1200 horse power; that Crossley's, the Premier Gas-Engine Company, Mather and Platt, Fraser and Chalmers, John Cockerill of Seraing, the Westinghouse Company, the National Company, Hornby, and many others are working up to the hilt on this work for gases of all sorts of thermal efficiency, from blast-furnace gases of 105 B.T.U., Dowson and producer gas of 150 B.T.U., Mond gas of 148 B.T.U., and water gas of 300 B.T.U., up to town lighting gas of 620 B.T.U. (which last, therefore, is far and away the most powerful and most suitable as well as already in the field of exclusive distribution, and would debar the rest but for the high prices in some areas)—one cannot but be impressed with the important field opening here for development on the soundest lines of permanence and stability, and of the farthest reaching importance to us.

It is obvious that, value for value, coal gas at 20d. or less per 1000 cubic feet is at once the cheapest, the most easily distributed, as well as the most reliable in action and simplest of application. It is absolutely impossible to limit the scope of our industry in this direction, for even the electric current, which challenges gas in the field of lighting, cannot be so cheaply generated as by suitable internal combustion engines. Every successful form of motor car is now actuated by gas generated from oil or petroleum. The late Sir Frederick Bramwell's prediction in 1885, that steam-engines would within fifty years be relegated to a museum, is being rapidly realized; while his further suggestion, that ships should be propelled by gas-engines, has lately been seriously considered in a paper read by Mr. J. E. Thorneycroft, and in the "James Forrest Lecture" of this year by Mr. Dugald Clerk.

The reasons for the displacement of steam may well be shortly dealt with here. The losses of the heat efficiency of the fuel employed in the boiler and to be developed through the steam-engine, are manifold, and may well be divided between boilers and engines in the percentage given by the late Mr. Bryan Donkin—viz., a loss of 35 per cent. in the boiler, and, with small motors, 92 per cent. in the engine. Beginning with the boiler, defective combustion, through insufficient air supply, bad flue circulation, losses in waste heat discharged by the chimney, in conduction of the metal plate from obstructions by scaling (always more or less present), and by irregular or imperfect circulation of water in the boiler, are all heavy. But they are inconsiderable by the side of the enormous disappearance of heat which Nature exacts when water is turned from the liquid into the vapour or gas form, which, while it occupies at the zero pressure 1600 volumes of the space occupied by the water, and has at that pressure no power in the engine, absorbs 95½ per cent. of the total heat theoretically required to give steam of a pressure of 300 lbs. per inch. Thus the waste of low-pressure steam systems is manifest; the difference in efficiency between 30 lbs. and 300 lbs. adding only 4½ per cent. in the consumption of carbon theoretically necessary.

The lending of power to the vapour by increasing its pressure does not demand any further sacrifice of heat efficiency; but the conveying of power from the boiler involves condensation, with consequent loss of bulk and pressure, and therefore heat efficiency. In the engine itself there is a further series of losses arising from condensation in the cylinder, engine friction, back-pressure of exhaust, variable load, and leakage of valves and piston; so that the average engine used in the ordinary workshop will be found to return only 8 per cent., and in many cases much less, of the heat efficiency of the fuel employed. The gas-engine, on the other hand, will give 38 per cent. of the total heat efficiency. Owing to the greater strength of its parts and the longer bearings necessary to resist the explosive strains, it has a longer life and a relatively insignificant charge for repairs; while, owing to the absence of the danger attaching to negligence in steam-boiler attendance, it needs hardly any supervision. These important merits are now universally recognized, and are factors in its rapid adoption on every scale.

An important illustration of large scale in power, as well as of the reliability and economy, of gas-engines is furnished by the installation of the Philadelphia Fire Pumping Station, recently described in "Cassier's Magazine." The system employs town gas of 24-candle power, containing 21·2 per cent. of carbon monoxide, 26·3 per cent. of marsh gas, and 32·7 per cent. of hydrogen, supplied to seven 200-horse power gas-engines, each pumping 2 million gallons of water per hour, and two 125-horse power gas-engines, each pumping 1¾ million gallons per hour. The saving of this plant as against a steam plant in capital cost is supposed to be more than 21 per cent. The reliability of these engines has been amply proved; but it was tested upon a 500-horse power gas-engine at Pittsburgh, which operated 98 per cent. of the year—being shut down only for a few hours on Sundays. This plant throws water to the ususual height of 230 feet vertically, with a pressure of 220 lbs. per square inch at the pumps. These great pressures are necessary, owing to the height of the buildings, which run into fifteen stories and often more.

In contrast to this enormous plant, it may be interesting to know that a 5-horse power engine, with gas made from oil, has for five years, working every day of the year regularly and unfailingly, pumped all the water for the supply of Ongar, and that the repairs upon this engine have been practically *nil*.

Is it therefore to be wondered at that inventors like Dowson and Mond have applied themselves to the production of a cheap power gas—the one to be produced on the spot, the other to be more economically generated at a central point on a large scale, and distributed? Roughly, the cost of Dowson gas will be about 6d. per 1000 feet, on the smaller scales generally useful. Dr. Mond claims to be able to distribute his gas at 3d. to 4d. per 1000 feet. The production of both these gases is well established. The distribution in the manner approximating to that of coal gas

has yet to be demonstrated. We can have little doubt that it will come.

Comparative Distribution.—We need not discourage either of these; for, owing to the low heat efficiency, and to their inutility for domestic lighting and heating, and their unsuitability for small motors (which our system deals with chiefly), ordinary producer gas will never be distributed and never made where coal gas can, by suitable discounts or other means, be furnished at 2s. per 1000 cubic feet. Nor will Mond gas be distributed, owing to its higher specific gravity (·7882) and its lower heat efficiency of 147 B.T.U., involving distribution of four volumes of double weight (say) eight times the weight per unit of efficiency, where coal gas can be sold for similarly large users at 1s. 6d. per 1000 cubic feet; and that will be quite possible when we deal with the enormous volumes and the lower illuminating power required. Our esteemed contributor, Professor Unwin, has shown that the distribution of Dowson gas is at a great disadvantage compared with coal gas.

When we approach the supply of power gas, we must remember that alongside of this lies the field of fuel supply; and here our own practice of using a gas generator furnace for retorts must satisfy us of what Siemens taught us thirty years ago, and what many of the large manufacturers are now finding—viz., that fuel in a gaseous form is in every way superior to that in the solid shape—cleanliness, controllability, applicability, and saving of waste are all obtained by the use of gas as fuel; and Dr. Mond desires to meet this want. Here, again, we find the conditions all in our favour. Why should not we, by modifying our practice and reducing our cost, take up this duty? May we not say fuel—which means power and domestic services, and, by Welsbach's mantle, light—is to be our flag in the future? Can we, as intelligent workers, mistake it? Is there not a clear call to us to divest ourselves of our trammels, our prejudices, our false financing, and other blocks in the way?

Possible Cheapening of Coal Gas.—Look at our practice, and what is really often the stumbling block to the supply of cheap gas—capital either dead or wastefully expended. The dividend ranges consequently from a charge of 5d. or 6d. up to 18d. per 1000 feet and even more. This difference of 1s. per 1000 feet is often purely artificial; but it is a great stumbling block to the consumer for trade purposes. Look at our enrichment and purification costs, and read the evidence of every one concerned (except a few fanatics, and the ignorant advocates of what they call the claims of the consumer), look at our restricted sales, and you cannot fail to see what thesummons is to us, and what is the direction we should go. "Fuel must be our flag;" and every household, every small trader, every user of power, will hail our advance.

Fuel Gas.—"Clear your minds of cant" said Dr. Johnson; and there is an enormous amount of cant and prejudice in the minds of those in powerful places who regulate our industry. Let us fight shoulder to shoulder to overthow it. There are leaders ready, and not the least among these is our veteran honorary member, who has in successive Parliaments pressed his policy, and so far with notable success. And let us not forget that the same leader has for years been in the forefront of the cheapening of the cost of gas, and, along with it, the conciliation of the labour that is spent in producing it.

The table attached to this address shows how the comparatively small addition to our total sales arising from the slot-meter system has altered and improved our financial position, and is still rapidly doing so in respect of the capital expended on storage and distribution. From it we shall see that, over the four groups of undertakings collected by Mr. Field, in the eight years from 1894 to 1902 (the last printed), in the order of (1) London Companies, (2) Suburban Companies, (3) Provincial Corporations, and (4) Provincial Companies, the capital per 1000 cubic feet went down by (1) 7 per cent., (2) 15 per cent., (3) 8½ per cent., and (4) 13 per cent. respectively. The number of consumers per mile of main increased by (1) 69 per cent., (2) 97 per cent., (3) 30·5 per cent., and (4) 28 per cent. respectively. The gas sold per mile of main increased by (1) 13·7 per cent., (2) 35 per cent., (3) 14 per cent., and (4) 20·3 per cent. respectively. The gas sold per consumer accordingly decreased by (1) 31 per cent., (2) 29 per cent., (3) 12 per cent., and (4) 3·4 per cent. respectively—the larger rate of growth in consumers naturally producing a reduction per head.

The total growth in sale of gas arising from all sources, and in the London Companies and the older Provincial Companies, coming more especially from slot-meter consumers, and from the increased use of gas for cooking among all classes, was, in the eight years (1) 30 per cent., (2) 66 per cent., (3) 44 per cent., and (4) 53½ per cent. respectively. Satisfactory as these figures are, they are poor compared with what may be expected if a substantial reduction—say, 6d. to 8d. per 1000 cubic feet—could be made from the more general adoption of gas for domestic heating in place of coal. The figures of seven years antecedent are given for comparison.

TABLE I.—*From Field's Analyses, Showing Progress and Effect of "Slot" Lighting.*

Title.	Thousands of Millions of Cu. Ft. Sold.	Capital per Thousand.	Consumers per Mile.	Gas Sold per Consumer.	Gas Sold per Mile (Thousands).
1902.					
London companies .	35·12	11s. 4d.	195	50,485	10,261
Suburban companies	8·0	11s. 1d.	126	40,613	5,405
Country corporations	18·66	10s. 7d.	171	33,500	6,115
Country companies .	11·5	9s. 6d.	129	41,435	5,712
1894.					
London companies .	27·25	12s. 3d.	116	73,226	9,020
Suburban companies	4·8	13s. 0d.	64	56,501	3,982
Country corporations	12·9	11s. 7d.	131	38,027	5,367
Country companies .	7·5	10s. 11d.	101	42,913	4,749
1887.					
London companies .	23·8	11s. 11d.	104	75,557	8,442
Suburban companies	3·5	13s. 3d.	57	53,892	3,388
Country corporations (estimated)	9·5	13s. 3d.	123	31,010	4,319
Country companies (estimated) . . .	6·0	11s. 3d.	86	37,156	3,526

Some criterion of this may be taken from comparing *inter se* the low-priced supplies in Field's tables with the high.

1	Glasgow	has 570	consumers	per mile,	2s. 6d. per 1000 cubic feet
	Edinburgh	,, 202	,,	,, ,,	3s. 4d. ,, ,, ,, ,,
2	Plymouth	,, 249	,,	,, ,,	2s. 3d. & 2s. ,, ,, ,, ,,
	Rochester	,, 86	,,	,, ,,	3s. ,, ,, ,, ,,
3	Leicester	,, 227	,,	,, ,,	2s. 4d. ,, ,, ,, ,,
	Manchester	,, 166	,,	,, ,,	2s. 9d. ,, ,, ,, ,,
4	S. Metropolitan	,, 229	,,	,, ,,	2s. 3d. ,, ,, ,, ,,
	Commercial	,, 154	,,	,, ,,	2s. 8d. ,, ,, ,, ,,
5	Wandsworth	,, 205	,,	,, ,,	2s. 4d. ,, ,, ,, ,,
	West Ham	,, 82	,,	,, ,,	3s. 2d. & 3s. ,, ,, ,, ,,

There may be circumstances here and there qualifying the conclusion drawn; but the consistent accord in the five comparisons is, on the whole, irresistible—viz., that cheapening the price stimulates the use as on ordinary lines. But how much further can the development go if once the price is brought to a figure which will meet the demands for trade and manufacturing uses, and for the displacement of steam power? In this last respect, a unique and bold discount of 20 per cent. on the Commercial district brought about such a general use for power purposes (still rapidly increasing). This was seized upon by the Chairman of the Junior Association of Engineers to show that, at such a price, it was more economical than Dowson gas fuel; and he accurately gave the numbers in use on this Company's district at that time of 900, now increased to over 1000. In that district further trade uses are now made of it on a big scale for fuel for bending large plates for shipbuilding, paper staining, type foundry, grain drying, white smithing, tyre shrinking, and in countless small processes in the general trades and manufactures.

As to the multifarious uses for town gas as fuel (remembering its very big thermal efficiency of 600 B.T.U.), you will all of you recall the list, condensed in the pages of the "JOURNAL OF GAS LIGHTING"—who have permitted me to inspect the book itself—from the catalogue prepared by the Denver Gas Company (U.S.A.) of industrial fuel applications ranging from a 650-horse power Westinghouse gas-engine down to a cigarette lighter. The list travels through furnaces of large and small scales for pottery, enamelling, case hardening, tool tempering, metal reducing and refining,

forging and brazing, calendering and laundry work, cloth singeing, tyre shrinking, baking, biscuit and confectionery plant, founder's mould drying, and an infinite number and variety of processes.

As to our means of meeting this coming demand for gas fuel, much can be saved in plant, space, and working cost, especially if the absurd niceties of purity be abolished, which leave us open to penalty if, on the one hand, a millionth part of a grain of one impurity escapes our vigilance, while, on the other, the same impurity is tolerated almost universally to the extent of 30 to 35 grains. These anomalies must be cleared away; and they are at the present time being examined into by a Departmental Committee of the Board of Trade. With regard to this inquiry, I will venture to predict that, when the evidence comes to be published, it will clear up much misunderstanding, and remove much undeserved stigma as to the impurities of coal gas as ordinarily manufactured, and, further, will open the eyes of the authorities to the extreme and hostile spirit in which the law has been administered by the Metropolitan gas-testing authority. Some of the evidence smacks of Shylock.

There is no reason why coal which produces 10,000 cubic feet of 15-candle gas should not produce 15,000 cubic feet of 10-candle gas. There are works where close upon 12,000 cubic feet of 12-candle gas per ton are produced, and burnt in naked-flame burners with satisfaction. The thermal efficiency, as shown in Table E. of a paper contributed in 1902, is only reduced from 628 B.T.U. where the gas produced was 10,120 cubic feet per ton, down to 577 B.T.U. where 12,500 cubic feet were produced. So that an increase of the bulk by 25 per cent. only resulted in a loss of heating power of 51 B.T.U., or 8 per cent.

Professor Lewes, in his lecture last year, showed that the reduction from 20 candles to 12 candles, or 40 per cent., was only accompanied by a loss of heat efficiency of 25 per cent.; and with carburetted water gas, the loss was much about the same. There is thus a clear gain in going down in nominal illuminating power; and it is notable that, for use in gas-engines, the low ignition-point of coal gas under pressure is somewhat of a drawback to the higher grades. Whether made direct from coal, or by adding water gas in the method suggested by Professor Lewes and others, there is little doubt that 10-candle gas can be made and distributed at a price, including interest on capital and working expenses, of not more than 1s. 6d. per 1000 cubic feet. Such gas would be workable in suitable flat-flame burners or argands, would be perhaps more suitable for gas-engines than any other gas now supplied, and would be a great boon as fuel for manufacturing purposes on large scales.

It is difficult to get parliamentary sanction for steps in this direction; and in the last session an Unopposed Bill for a country district was barred until the illuminating power was brought up from 13 to 14 candles. But in spite of prejudice, some movement in this direction must come, and this field of usefulness must be occupied by our industry; and it is for us gas engineers to face this question in no narrow spirit.

Attention has previously been called to the want of a gas-power motor which shall be as handy for shipbuilding, or any other large construction requiring rapid and varied alterations in the position and the use of small tools—such as drills, rimers, taps for screwing, riveting, &c.—and as flexible and light for handling, as the electric tool-driver working with a wire, which is certainly as flexible as the india-rubber gas-pipe, though less safe to operatives. Experiments are being made with a motor, originally for petrol vapour, slung to a bicycle frame, for certainly a very large field of usefulness awaits such a development. Our friends the gas-engine makers attach even small motors to bases which are unduly ponderous and do not lend themselves to slinging about in any structure like a many-storied building or the hold of a ship, intersected as it is into numerous compartments. But there is on show at the Exhibition at Nantes a 5-horse power high-speed gas-motor which does not appear to weigh much more than 2 cwt., which would be most suitable if only the circulation of water round the cylinder were not accomplished by the crude attachment of a water-tank of 20 gallons capacity, adding to the weight and making cumbrous a motor which otherwise could be easily moved about. This could be surmounted; and such an engine has been ordered to England for trial.

But even if we cannot easily dispense with electricity in transmitting the power to the tool, we can at least congratulate ourselves that the electrician can have no cheaper source of original power than that which is furnished by our gas. You will have seen from the "JOURNAL OF GAS LIGHTING" that at Malton the Northern Counties Electric Supply Company have taken gas for ten years at 2s. per 1000 cubic feet. We must thank the Gas Company for their spirited action. An audience like this need hardly be reminded that electricity is not in itself a source of power, like coal or gas, but only a medium of transmission corresponding precisely with water or air pumped against accumulated pressure, or the strap and pulley, or geared shafting. Though of all these methods, for long distances and indirect routes, possibly electricity is the best, it has itself definite economic limits of distribution, that are much closer than those attaching to the distribution of coal gas.

DISTRIBUTION.

Professor Unwin, who gives us a treatise to-day upon the very important subject of "High-Pressure Distribution," has shown in his Howard Lectures what this limitation is for copper leads; and the details given of the very important experiment to which he therein draws attention are most instructive. He also shows us that the coal gas delivery through a 6-inch main 5000 feet long, with a loss of less than 25 inches head of water, is 31,815 feet of gas per hour. Allowing the modern equivalent of 18 feet per horse power, this returns us 1767-horse power per hour; and as the cost of such a main would be not greater than £555 (the interest on which could not come to more than £28 per annum, while the depreciation, as we know, is practically *nil*), it follows that the cost of the distribution would only be 3·8d. per horse power for the whole year's working, whether of 3000 hours or more.

He shows that Dowson gas similarly treated would demand a pressure of 55½ inches, and, by reason of its inferior efficiency, would only deliver 353-horse power at this extra cost in pressure. The interest here works out at 19d. per horse power for the year, whether of 3000 hours or more, to which must be added the cost of the additional 30 inches head of pressure absorbed. Our esteemed member Mr. George Helps, the President of the Midland Association, has dealt admirably with this part of the question, as he is best qualified to do, as he has practically demonstrated the economy of distribution at 25 lbs. pressure, which, in this country, is unique.

In the report given of the Lauffen Frankfort electric experiment, the transmission of 100-horse power was effected through 108 miles of suspended wire, and cost fivefold as much as steam on the spot. The conductor cost £15,000, and which, if properly insulated and bedded in the ground, as would be necessary for permanent installation, would add, at the low rate of 6s. 8d. per yard, not less than £63,330; making a total of £78,330. Interest at 5 per cent. and 2 per cent. depreciation on this would come to £5480 per annum, which, on 100-horse power per hour, would make an annual cost of nearly £55 per horse power, either for 3000 hours or more, as taken in the foregoing, for transmission, apart from the cost of power, motors, &c. Allowing for the difference between the 108 miles and the 5000 feet, these figures yet show us how enormously cheaper is the distribution of gas than that of electricity. Gas, moreover, is a source of power; while electricity is only the result of expensive appliances for getting power current.

Thus in two quarters, Nuneaton and Malton, we get actual illustration of the practicability, on which stress is laid, of our industry taking up this great field of fuel and power distribution. What an arena of utility and enterprise is here opened to our profession. Can we be too sanguine and urgent in pressing its importance and the necessity of our devoted co-operation? Shall we not gain something in status, and this Institution achieve the greater dignity and influence if this be brought about? What an improvement in the amenities of the manufacturing towns would follow upon a smokeless fuel and the removal of unsightly chimneys; what benefit to the health of the crowded operatives; and what economy and convenience.

LEGISLATURE AND THE GAS INDUSTRY.

Among general observations you will look for, will be some upon the attitude of the Legislature towards your industry.

Transfers to Municipalities.—As to the most vital—the transfer of gas undertakings to municipal bodies—the exposures which have lately been made of the extravagance and the

incompetence attaching to a great deal which has been done by progressive bodies, has checked the disposition to transfer gas undertakings, though where companies come for the first time and it is specially shown that their undertakings have lapsed into defective condition there is danger of the view being taken that they should be dispossessed. This never attaches to a statutory undertaking which can prove that it has discharged its obligations properly. The value of such undertakings for transfer continues to be maintained at a high level among the best class of investments. At the same time, on the other hand, it is impossible to shut one's eyes to the fact that, owing to the appreciation of the value of money, all first-class investments have been for some time past cheaper, and are likely to remain so, as compared with twelve years back when an extremely low bank-rate prevailed.

Sliding-Scale.—In connection with the sliding-scale, there has been a slight disposition to retrogression, and in one or two cases it has been abandoned. The first instances of sliding-scales were in the Watford Act, 1871, and the West Ham Act, 1869.

Illuminating Power.—The tendency towards the increase of illuminating power has been checked, and even that opponent of gas, the London County Council, in a Bill for the Metropolis in 1903, recognized the greater utility of the cheaper gas.

Purity Testing.—The Departmental Committee of the Board of Trade on Testing, previously alluded to, must result in fresh standards of quality and purity being required by Parliament; and though limited to the Metropolis, it may have its ulterior effect on the Provinces. We must devoutly hope for more rational lines.

Street Main-Laying.—We are likely to be further affected by the report of the Commission on London Traffic, which will deal with some regulation of the extent to which we, among many others, shall disturb the pavements of the town. These provisions will, no doubt, ultimately affect provincial towns.

Rating.—A Bill is pending to apply the system of re-adjusting the rates quinquennially, which has long been in use in London, to the country at large. This seems to be framed without consideration that the power of appointing assessment and valuation committees should not be in the hands of corporations owning large properties which need assessment.

Slot Regulations.—There is a disposition to regulate the terms upon which slot-meter consumers are to be supplied, following the precedent set by the London County Council for the London Companies, which was promptly accepted by them, as it did not exceed the terms already in use. But it became necessary last session to circulate some information on this subject, as there was a danger of legislation going to excess in prescribing a sort of sliding-scale which, as it appeared to some of us who deal with these questions in Parliament, was on an unsound basis. The simple lines of one rate for all services have worked most satisfactorily so far. No system is more popular; and complication will in the end hamper its progress.

Electrolysis.—The protection given a year or two back against electrolysis in a number of Tramway Acts has not been extended, and reasonable efforts in this direction are met by reference to the Board of Trade regulations, about which, unfortunately, there is not sufficient length of experience to enable us to accept them on the one hand, or to overthrow them on the other. The ordinary common-law provision, that damage done should be paid for, is, unhappily, set aside in a statutory undertaking except direct negligence be proved; and it would seem curious that where injury is so plainly possible there should not be this simple remedy.

The Bermondsey Clause.—The checking of competition from municipal electrical supplies at unremunerative prices, supplemented by the aid of the rates, went fairly well on the Bermondsey lines for some time. But a heresy arose as to strangling an enterprise in its infancy by not letting it establish itself, and the comparison of the early history of gas and water supply for similar loss was referred to, but very fallaciously, for there is all the difference between private capital and money raised by force of rates. Quite recently, common sense has revived; and in the current session the Marylebone Act and the Ilford Act have had the clause inserted by Lords' Committees.

Municipal Accounts.—Legislation is wanted badly for municipal accounts auditing. The accounts are not always put in a clear shape, and they are often hopelessly delayed in publishing, which prevents a proper knowledge before they are passed.

Finally, we cannot expect to be ourselves exempt on any grounds from legislative control, enjoying as we do the practical monopoly conveyed to us by the power to lay pipes in public ways. If we desire reasonable liberty to develop our business, we must seek it by forming and informing public opinion.

General Subjects.

Slot Supplies.—The development of the popularity of "slot" supplies of gas and fittings has been already referred to; and we shall have a good discussion on the paper prepared by our experienced authority, Mr. Colson. In the aggregate, it does not bring a very large increase to the sale of gas; while it does bring a very considerable increase to the amount of capital expenditure (not much less than £300 per million cubic feet of gas sold), and that in a direction quite abnormal — being inside the consumers' houses. It, nevertheless, levels the load-factor by the habit of summer usage for cooking.

The extended adoption by the public of the Welsbach incandescent mantle burner, with practically little or no aid from the companies, has gone on in the neighbourhood of London to an extent altogether phenomenal. More remarkable still, the merits of this light, and its economy, have compelled the local authorities who have electric lighting undertakings of their own to make contracts for several years ahead for gas lighting on this system rather than extend their own electric lighting.

Sliding-Scale.—The sliding-scale has brought about a material reduction in the amount of capital per unit of gas sold, coupled, in many cases, with a corresponding diminution in the charge for dividend, though higher percentages on capital have been paid. This has not been brought about without a much larger advantage to the consumer in the abated cost of his gas—giving him, in fact, from four to eight times the value of the increased dividend.

Carburetted Water Gas.—The use of water gas, though threatened with adverse legislation, has continued to extend. Its value for enrichment purposes, at the moderate prices for oil prevailing in recent years, has given it a strong position in our policy; while its great uses and conveniences are widely recognized, and it is a well-liked handmaiden to most coal-gas works. No small recommendation is its reducing action on naphthalene.

Vertical Retorts.—Going to our coal-gas processes, we hail the advent of a continuous system of carbonizing in the Settle-Padfield vertical retort, which has been tested by one of our members to yield 13,000 cubic feet of gas per ton. No other system suggests that uninterrupted action which eliminates all the losses of heat and of material due to the charging and discharging of the retorts intermittently, whether horizontal or inclined.

The Centrifugal Charger.—Simultaneously with this, we have introduced to us the De Brouwer charger, on which we have a paper by Mr. Bell, of Derby, who has been quick to appreciate the simplicity of its form and the directness of its action.

Discharger.—We have further an improved means of discharging which does not need that the coke should be crushed, as with most mechanical drawing machines of the past, inasmuch as in its caked condition in the retort it is found easy to push the coke out by suitable extended ram heads, whether moved mechanically, as in the Paris machine, or by hydraulic pressure, as in the simple and thoroughly efficient machine of Mr. Hunter, of the South Metropolitan Gas Company.

The Paris Charger.—The Paris charging machine, like the De Brouwer, uses the centrifugal force of a reversed turbine or projector; but in this machine it is horizontal, and changes the direction of the stream of coals from the hopper. It is much more heavily and expensively constructed, and has a more complicated action; but an inspection in Paris in the spring of last year satisfied one of its practicability.

The differences between advocates of horizontal and sloping retorts, among those carbonizing on a large scale, are not yet finally settled. The introduction of the vertical retort, the discharging apparatus, and the De Brouwer and Paris charging machines, will go far to cause us to hold our hands before making great changes in the direction of sloping retorts, at any rate in existing plant; while we hear they

have made important converts. The use of a hydraulic pusher along with the inclined retorts at Edinburgh, shows that the introduction has been anticipated; but it further proves that the inclination does not suffice to discharge the coke.

The Gaslight and Coke Company are putting in the Paris charging machine at Beckton, and the Commercial Gas Company are providing for a De Brouwer charger and the hydraulic discharger; so that at no distant date the particulars which Mr. Bell can give us will be supplemented by additional experience near at hand, as well as by Mr. George Helps's practice at Nuneaton.

Purification.—The extraction of cyanogen is the only addition to our methods of any importance; the washing of the gas with sulphur solutions and with sulphate of iron solutions being the methods most in vogue. It has not gone very extensively with undertakings not employing lime, as, in the case of oxide of iron, the recovery is established in considerable proportion through the oxide, especially on the Continent. At the moment, we have some contentions on the merits of certain forms of sieve bars for oxide of iron purification. The importance of this detail is diminished where, by the large area of the vessels, revivification *in situ* is possible, which in cases known is found to cause a great saving.

Residuals v. Enrichment.—In meeting such larger uses of gas for fuel and power as would fall within the practicable reach of our distributing system on the lines advocated, we should perforce produce a large quantity of other fuel—viz., coke and pitch. The former, being smokeless and giving a more lasting as well as a less wasteful fire than coal, is always in request wherever solid fuel has to be used. Its enduring quality is well known to the poor, who often give weight for weight a higher price for it than for coal; and though domestic servants in better-class houses despise it and insist on its being damaged by being broken, we shall find it, if we use it in place of coal, one of the greatest of luxuries—giving a bright glowing fire, and requiring 50 per cent. less attention and replenishment than coal.

It needs to be better known and to be used in larger pieces as made, when it comes nearer to a log fire in its clean incandescence than any other fuel. Considered from the point of view of the saving of our national resources in the coal measures, carbonizing coal for gas-making realizes an important economy. Unlike the user of steam or solid fuel, we do not destroy the coal, but convert it; and, where we employ a regenerator furnace for our retorts, we accomplish the conversion with the minimum of loss in fuel. So converted, we return to various consumers gaseous and solid fuels, pitch, colours, oils, varnish, solvent spirit, antiseptic chemicals and drugs, and the richest fertilizer known to man, and the only manufactured one containing ammonia as such. We furnish sulphuric acid from what are wrongly called the impurities of gas, as, in small proportions, they give the combustion of gas a positively antiseptic value. Allowing 10 per cent. of the original coal weight for fuel, we return from our process 90 per cent. in valuable forms.

It has even been lately suggested by a writer of some eminence that, having regard to the smoke nuisance and fogs, we should receive at our works the private supplies of coal and give back the coke, paying a small price for the gas and other matters recovered from it. This may be considered Utopian, but it conveys a perfectly sound idea—viz., that it is more profitable to the community to allow us to carbonize all the coal and give them back the products, instead of sending as they do by the defects of an ordinary grate and chimney 95 per cent. of the value into the air above the house-tops.

This feature of reproduction, in gas and residuals, instead of destruction as in direct uses of coal for steam and heat, causes many of us to hold our hands as to adopting processes for saving labour or cheapening cost, such as would materially reduce or displace their value. All kinds of enrichment, from whatever they come, whether cannel, carburine, or carburetted water gas, are open to the drawback that they furnish no residual products.

Enrichment.

This consideration lies at the root of the comparative prosperity and low rates of charge (which are practically convertible terms) between companies supplying respectively 16 and 14 candle gas. An examination of the records of companies in the London district, two of which have been under my personal control for many years past, supplying respectively 16 and 14 candle gas, as well as of other two whose working is clearly set out in "Field's Analysis," reveals unmistakably how the cost of enrichment between two systems swells the net cost for coals and residuals to the company using enrichment through the last nine years, by an average excess in the larger company of 1·5d., after allowing for the difference on coal carriage. It appears that enrichment to a suburban company supplying 16, as compared with one supplying 14 candle gas, has swelled the net cost of gas by an average of over 2d. per 1000 cubic feet, after allowing 2d. for cost of coal carriage. The difference in the gross cost of the materials is throughout less than the difference in the net, as the suppression of the residuals from the enriching materials contributes some additional loss in every case.

It is not at all easy to get cases perfectly analogous anywhere, and outside the London area it is not possible; but a general review of the experience of 14-candle companies in the South of England shows an assured prosperity and a persistent reduction in the selling charge for gas, which establish the merit of their lower standard and the gain to the consumers.

But the removal of the cost of enrichment alone does not complete our aim; and we must get the cost of production below that of 14-candle gas, if it can be accomplished without a corresponding surrender of its heat efficiency. On a former occasion, considerable attention was devoted to this subject; and experiments made in connection with a paper to this Institution in 1902 demonstrated that the practice on the Continent of producing 12-candle gas from Newcastle coal, and obtaining about 12,000 cubic feet per ton, secured a great saving, and that still greater advantage would be obtained by further diminishing the nominal illuminating power. But before 10 candles can be reached, great alterations must be made in the burners, if used for naked flames without mantles. From the large thermal efficiency of 10-candle gas, as determined in these experiments, it was quite clear the illuminating power as shown was below that which a burner more suitable in its air-passages would have given.

And upon this point our members would do well to study a somewhat ancient piece of literature which has been reprinted from the files of the "Journal of Gas Lighting"—viz., the report by the London Gas Referees in 1871 on the "Construction of Gas-Burners"—which in the clearest and most emphatic way points out that the poorer the quality of the gas the more air is required. It shows, further, that the general public is contented to employ burners which sacrifice from 38 to 92 per cent. of the value of the gas. But, with the Welsbach invention we need not labour this. Professor Lewes proved to us a year ago that even blue water gas would, with the Welsbach mantle, give abundant light.

But this is not the whole question; we must save the losses inevitable with purification by any other means than by oxide of iron. The sulphur removed should become profitably available for the manufacture of sulphuric acid. The material should be revivified *in situ*, as is the practice in many French gas-works, thus dispensing largely with labour.

Labour.

Probably no industry has had so great a change brought about in its labour conditions in the matter of time limit in recent years as the gas industry. And many vexed questions have arisen, and been somewhat sturdily contested, owing to the combination of the workmen in a somewhat extensive Union. The conditions have been very materially altered to the advantage of the workers; but no step in this direction has ever given more satisfaction than the institution of what is called "Profit Sharing," in the case of the largest Company within my purview. A profound belief in appealing to self-interest and in specially rewarding faithful work, and an experience in two cases of well-established systems of bonuses on good returns which worked satisfactorily, but did not necessarily lead to savings, and certainly not to investments in the stocks of the companies, led one to entertain with great interest the adoption of profit-sharing, by which a uniform percentage was added to the wages of all the workers so long as, by their efforts in great part, the undertaking was able to supply gas at a standard rate, on which any reduction should be accompanied by an increase in the percentage paid to the workers.

As the labourers all start on a basis of being paid different rates according to the value of their respective duties, this mode of rewarding them for good service is not quite so artificial as it might at first appear, though it is not altogether free from the defect of giving an equal percentage on the pay of many workers who are less effective in the direction of improvement in the working result than others. But it has the merit of being extremely easy of application and simple of understanding by the men themselves; and it certainly guides them to seek to improve the results of their mutual labours and to save the extra wages so earned. It further brings about satisfactory investments by them in the stock of the Company.

It would be an ideal condition that the finders of the capital, the labourers, and the consumers of the gas should all be shareholders together. The system finds favour with the men, as showing a broad and plain intention to "help them to help themselves;" and so long as it is free from any pampering or false indulgences—which workmen are quick to despise and to base encroaching pretentions upon—there is no doubt that it brings about a healthy spirit of concurrent effort and good discipline. There is good grit in the men, "a splendid peasantry their country's pride." We, representing the employers, only need to know them more closely to get tighter grip of them and to enlist their intelligence, while we gain their confidence by unswerving justice in our methods and friendly sympathy in our manners to them. They have invariably made good use of the suspension of Sunday work, which is now almost universal.

Rating.

A reference has been made to proposed legislation on rating. Perhaps in the whole scope of an engineer's practice, nothing will give him more trouble and anxiety from time to time than this question. In Scotland and Ireland, the assessments of gas and similar undertakings are made in the first instance by an independent valuer appointed by the State; and on this system, hardships and miscarriages are seldom brought about. But, unfortunately, in England it is open to the overseers or assessment committees to employ partisan surveyors; and cases have been known where they were actually paid by a percentage on the increase they could establish in the rateable value. This leads to surveyors with more or less partisan bias being called in to defend the undertakings from injustice; and probably no process is so uncertain, and no tribunals are so little to be depended upon, as those one encounters in Rating Appeals.

The theory of the hypothetical tenant, which has been invented to meet the very fair-sounding and simple proposition of finding the rent which would be paid, is based upon such a string of purely theoretical suggestions on both sides, and the actual figures contained in the balance-sheets are so frequently departed from and ignored, where they would be safer than any possible hypothesis, that the very widest differences are shown between the values as brought out on both sides. These differences are accentuated by the disposition of bodies like assessment committees, composed often of private tradesmen, to "go for" large industrial undertakings, such as railway, dock, water, gas, and similar companies, and thereby relieve their own rates. The hypothesis that the tenant would pay a rent equal to the whole gross profit of the undertaking, less interest upon the actual money that he must bring into the service, often worked out very unfairly; and twice in my own experience such miscarriages have happened that the rates and taxes borne by the undertakings worked out at more than 4d. per 1000 cubic feet of gas sold.

But in modern times, the hostile rating surveyors have encountered a very stubborn obstacle to their predations in the very largely increased value of tenant's chattels which are essentially involved in the new method of supplying gas to working men, whereby the hypothetical tenant has to supply the working man with a somewhat more expensive meter, arranged for automatically delivering gas in instalments of pennyworths, connected with internal fittings for lighting and cooking. These outlays are so considerable that, upon the amount of gas sold in this way, they will cause an expenditure of not less, and often more, than £300 per million cubic feet. It will be remembered that Mr. Field, the former Accountant of the Gaslight and Coke Company, gave evidence that the whole of the extensions of that Company had recently been for making and delivering gas at about £300 per million cubic feet; so that for such gas as is so required, the tenant's share of the capital is nearly equal to the landlord's.

In a recent rating case which was of great interest, the surveyors and valuers on both sides pointed out that this new condition of things made it impossible that the rateable values that had previously been current in two important districts could any longer be maintained, unless a new method of valuation was adopted; and a very bold, and obviously indefensible, jump was made in this direction. We may look, I think, with very considerable relief to these developments; and also, to a large extent, to the amount of capital bearing small interest which has been brought into the undertakings for all purposes by the operation of the auction clauses.

Clearly, if money be raised at 4½ per cent. for gas companies' use, and a portion of this be spent upon tenants' chattels, in respect of which 17½ per cent. is to be taken, the remainder of the money cannot be considered to be earning 5 per cent., which is the surveyors' favourite figure for the assessment of the manufacturing works, as apart from the distributing system. It is thus evident that, in place of the finding of a very extensive and expensive revision of the rateable value of a large Metropolitan Gas Company some years back, which resulted in over 50 per cent. of the gross profits being taken as assessable, something more like 33 per cent., and in future even less, will represent the value—unless the whole series of precedents on which the Courts have been acting shall be authoritatively over-set.

A final remark on this subject may be permitted. It is impossible to escape higher assessment where the capital concerned is high per million cubic feet of gas sold, because the determining factor from which all valuations must start is the amount of profit necessary, which, of course, is high to cover the dividends upon such capital. An undertaking which needs to earn 1s. 6d. per 1000 cubic feet of gas to pay interest upon its various capitals, cannot but be ultimately assessed at more than twice as much as another of equal output where the dividend and interest only take 9d. per 1000 cubic feet. This was roughly the average rate for the United Kingdom in the year 1902, when £6,378,400 was earned on a capital of £112,867,000—say, 5⅔ per cent.—and upon a sale of 148,000 million cubic feet.

The Institution's Work.

Coming, now, to our Institution. Mr. Dougall outlined seven departures as part of the programme for the Institution. You will perhaps think that, as two of the most important of these have been effectively dealt with, the Council have not been idle. You will have read that the linking-up of the District Associations has made good progress, and three of the most important have passed resolutions which must result in their joining us. Much help was afforded in this by the President of the Midland Association, who formulated a series of most practical resolutions as affording the best lines of amalgamation. Rules are submitted to you for making the library a thoroughly effective circulating one. Another suggestion was that our Institution should undertake the running of chemical laboratories and experimental works. The realization of this very proper ambition would clearly necessitate, as is otherwise most desirable, a convenient home in a separate building for our Institution, and the installation of a well-fitted laboratory; but, chief of all, the appointment of a Consulting Chemist. Such an expert adviser could not possibly undertake alone the commercial analyses so commonly necessary in our business. He would need to be confined in operation to the prosecution of research, and at any rate could, in correspondence with our members, most usefully aid in the clearing away of doubts, the dispelling of errors, and the promotion of practical investigation. Such a provision would further be helpful in training our students, and supplementing their reading by demonstration and experiment.

Education.

The supreme value of workshop practice in mechanics has been dealt with at great length. This sort of training has produced some of the most distinguished engineers in the world's history; and it is open to the unlettered, such as some of them were. There are those

observers to whom facts and experience appeal with a power beyond that of any books. They read in the open pages of Nature. If one demanded from the whole of our members high scholastic attainments, one would be pressing a Utopian view. One does not despise book-learning; but a life's experience teaches one to distrust the mere pedant. We have had too much interference from savants, with all respect to them; and, in the homely words of the workshop, "an ounce of fact is worth a pound of theory." That is why your Institution would do well not to bar its avenues by severe scholastic examinations, such as are only easy to the lad fresh from school or from the crammers. What more unhealthy imposture exists than that of cramming the mind temporarily, seeking to replace proper education with mere feats of the memory?

Unless the student has something more than the gift of memory—to repeat, parrot-like, in reply to examination papers, the passages he has been directed to read—the book is useless. Better the uninstructed natural curiosity and interest in his vocation that makes the comparatively unlettered man keen to acquire information from any and every book he can reach. Without this spirit, all the book-learning of the Universities will be futile and sterile. What education had the boys Watt, Stephenson, and Faraday? The former actually studied the literature of wind instruments purposely that he might build an organ, of which he knew nothing before he was asked to undertake it.

There is nothing in history more sublimely pathetic than the story of George Stephenson denying himself the rest which his day's toil of twelve hours needed, that he should earn (by clock-mending in overtime among his neighbours) the slender funds necessary that his boy Robert should get the barest rudiments of education. What a contrast is this to the misdirected, and often wasteful, expenditure on technical education so lavishly provided in latter days, often out of the surplus funds of the City Companies, which appear to be directed into this channel as a sort of counterbalance to their sumptuary expenditure.

Education.—With a suitable home containing a lecture theatre, even on a small scale, more frequent meetings of our members would be possible, and classes for students might be held—direction being given to their reading and instruction. It is felt that the student should be entitled, with some reasonable test of his technical ability, to pass into the class of associate member, and later (with reasonable proof of a due acquisition of experience in a term of responsible practice) he should be entitled to the grade of member. This view is pressed because, although practised in other Institutions, it appears illogical and unfair to enlist a youth in the lower class, and then bar him from the others by insisting on tests of academics or scholarship not necessary to the practice of his profession, and, moreover, hardly in the power of an actively employed worker to obtain leisure for their acquisition.

One is never too old to learn; and these remarks would be incomplete without some reference to our indebtedness to the two technical journals devoted to our craft. It is no idle compliment to acknowledge the care and discrimination with which they both follow up the progress of scientific work, whether directly or indirectly cognate to our industry, and furnish us weekly with "pabulum" fit for the most advanced, and often taxing our best intelligence to keep up with.

Our chief object should be to inspire our younger members with a truly professional spirit, and to make them feel that their own status and success, as well as those of the Institution, depend upon their personal efforts and upon the standards they set before themselves in their ordinary professional walks. One important aim is that we should keep the designing and specification of our work in our own hands, rather than rely upon the suggestions of those who, though practically skilled in the manufacture of plant, have not the essential knowledge and experience of the operation of our various processes, their variations and incidents, and who have no interest, once the plant is completed, for its successful, profitable action. We alone have this experience and bear that responsibility. With such a spirit of professional co-operation as is asked for, the humblest manager can, by noting carefully his observations of the processes, with their differences, and carefully examining the causes of such, do much to aid all ranks.

If there should be some—unskilled with the drawing pen and unpractised in specifying—who find themselves in need, they should be sure to find friendly—nay cordial—counsel, reference, and aid, from their more experienced or advanced fellows of all ranks, and be put in touch with those who can serve their purpose and work out the necessary details. Far better this than that they should fall back upon the contracting engineer, whose assistance will necessarily be exclusive of all competition when the work comes to be carried out, and will, in the end, cost those concerned more dearly than if proper steps be taken to secure fully competitive tenders. This is dwelt on because one too often sees works showing so plainly signs of the hands of the contractor, and evidencing his profit rather than the skill and ability of the engineer, that one is amazed at the easy compliance of those who find the expenditure. When, for instance, we see retorts so equipped as to cost £300 against £50 each, when purifiers cost 50s. per square foot instead of 10s., we can but grieve at the waste which defeats cheap production of gas, for there are but 200 days of working to earn the interest, upkeep, and amortization for the whole of the year.

Incomparably the best designer is the experienced works manager—the gas engineer. We must preserve that proper distinction by not yielding our place, under whatever temptation. In this connection, it must be said—as against costly mechanical complications—that the simpler works have lighter repairs and fewer losses from breakdowns and interruptions, the capital charges are less, and their rateable value is less. Although to the superficial observer they be less imposing in appearance, they produce cheaper gas, which after all is the proper aim. Look where gas is cheap, and you will find these simpler works. Go, among many others, to the works of our late member, Mr. Foulis, who exemplified in his proper person the qualities we should seek. Go to those of our distinguished honorary member, Sir George Livesey.

Not to be invidious, this reference cannot be extended. It is restricted to illustrations of indisputable authority; but cases will be present to the minds of most of us illustrating the contrast between that lavish capital outlay in so-called labour-saving devices, which makes the supply of cheap gas impossible, and the simpler, so-called old-fashioned, low capitalled undertakings, which at any rate meet the consumers' wishes for lower-priced light and fuel. Two cases from one's own recent experience: A. The large daily production of 8000 cubic feet per mouthpiece from retorts costing £25 each; a capital account of £350 per million being accompanied by 15-candle gas at 2s. 2d. per 1000 cubic feet. B. A concern in a fair way to rival this, suddenly saddled with £40,000 of contractor-designed plant, which added £180 per million cubic feet to the total capital account, and therefore 2½d. to the dividend charge, ¾d. to the rates, and 1d. to the repairs, and saved a possible 1d. on carbonizing wages!

Should it be thought that too much is made of this point, it is based upon the personal experience of offers made by contractors to supply an engineer with plans, drawings, and estimates that he could adopt and put forward as his own. Further, a contractor was known to boast that he could turn out a better design of one section of plant than any single engineer, as he had collated, from his tendering upon them, the plans of all the leading engineers of the day. But he forgot that, as he had never worked such a plant for a single day, and as gas was not standing still in scale and other requirements, he could not provide for the present and the future, though he knew what had sufficed for the past.

Besides keeping our proper work in our own hands, we must be jealous of our professional prestige, and must remember the obligations resting on our individual action. From time to time come unfortunate revelations that cannot be conscientiously ignored showing in startling colours and distinctness the dangers and temptations that beset those who are weak in self-respect, or in too great haste to be rich. The Institution should furnish to all a symbol of brotherhood in an honourable profession, which should shun any mean act, should discountenance laxity of principle or conduct, and should bind the leaders to the humblest members in one cordial spirit of loyalty and mutual helpfulness. The heads must be true to protect and encourage the juniors; and the juniors must be loyal and devoted to those who have proved their worth by their position and experience. This spirit we know largely exists. It is the special mission of this Institution to foster and develop it.

There have been dealt with the anxieties and burdens of the engineer responsible at times for difficult works of

construction, and always for the unfailing supply of gas. It is worth considering what are the rewards that may await him. Adverse reflections have been made as to his reaching the position of director. Surely this is a mistaken view, or arises from unfortunate special experience. As Napoleon encouraged his recruits with the suggestion that their knapsacks might contain the bâton of a field marshal, so it is a proper ambition for every engineer that he should, in his later days, administer the undertaking to which he devotes the best of his life.

Happily, this consummation is no longer a rare experience; and there can be no doubt the verdicts of officers, staff, and workmen would all be in favour of such promotions, as they insure that the condition of all classes of the employees is thoroughly understood, their labours and troubles sympathized with, and their emolument duly considered. Such directors are bound to feel a stronger natural sympathy with the workmen than those who had not similar experience. But if not in this way, there will be many others more or less direct in which the conscientious, self-respecting engineer will gain by the accumulated confidence and respect his faithful career will inevitably earn.

While these words are being spoken, there rings still in our ears the parting knell of Dr. Smiles—the engineers' historian. He wove romantic interest into the prosaic lives of the giant engineers of the early part of last century, and faithfully showed how humble, plain, unlettered men accomplished great things for the nation and the world at large. His books "Self Help," "Duty," and "Thrift" convey a sound living philosophy which encourages us all, against despondency and self-distrust, to seek a high ideal.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 672.)

The counter attractions of Epsom Downs must be held responsible in some degree for a reduction in the volume of business last week on the Stock Exchange. But it could not depress the buoyant tendency which prevails in markets generally, although movements were a little chequered in midweek by the usual realizations to secure profits. Before the close, however, things were again on the rise; gilt-edged securities being specially favoured. In the Money Market, there was a good, steady demand, and the superabundant supplies seeking employment found their object; but there was an easier tendency towards the close. Discount rates were at first considerably lighter; but they steadied later on. Business in the Gas Market showed a reduction in volume as compared with what has been the weekly average of late; but it was more liberally distributed through the list of undertakings. The tone generally was very good, and there is a distinct indication that gas as a class of security is fairly embarked on the course which should lead it back towards the high position it used to occupy some years ago in the array of investments. Whether this goal will ultimately be attained depends on factors, both intrinsic and extrinsic, which are yet behind the curtain of the future; but already some choice companies are creeping up very near a 4 per cent. value. Business last week in Gaslight ordinary was only very moderate—about enough to make one good day's work at fair pressure. The prices marked ranged between 94 and 95, which was a fraction easier than the preceding week. The secured issues were but little dealt in, and were devoid of incident. South Metropolitan was more active, and was in good demand at rising figures; the closing mark being as high as 127½, and the quotation being advanced. Not much was marked in Commercials; but the prices rose rather freely, and the quotations advanced materially. There were no movements in the Suburban and Provincial group on the London Exchange; but Sheffield "B" and "C" and Newcastle advanced in their local markets. Business in the Continental Companies was moderate; and quotations remained unchanged. The Directors of the European Company announce an increase in the bonus from ½ to 1 per cent., which will bring the amount of the dividend and bonus for the year up to 11 per cent. Among the remoter undertakings, River Plate was lower; but Buenos Ayres debenture advanced. Business in the Water Companies was fairly active; and prices were very buoyant almost all round. Several issues had a more or less considerable advance. The Directors of the Grand Junction Company announce that their next dividend (to be their last) will be at the rate of 12 per cent.

The daily operations were pretty uniform; and the changes were as follows: On Tuesday, Buenos Ayres debenture rose 1. In Water, Chelsea and Lambeth rose 2 each, and both Chelsea preferences and New River 5 each. On Wednesday, South Metropolitan advanced 1. On Thursday Commercial 4 per cent. rose 2. In Water, East London and Kent were inadvertently lowered; but the error was rectified next day. On Friday, Commercial 4 per cent. rose 2½, and ditto 3½ per cent. 3; but River Plate fell ¼. In Water, Southwark rose 2, and Grand Junction 1½.

THE EARL'S COURT GAS EXHIBITION.

The preliminary prospectus of the International Gas Exhibition to be held at Earl's Court, from Nov. 19 to Dec. 17, has been issued. The President of the exhibition is the President of the Institution of Gas Engineers—Mr. H. E. Jones; and the list of Vice-Presidents is such that the "international" character of the exhibition can almost be said to be assured. By the Vice-Presidents, gas companies and corporation gas committees are strongly represented—the names including Col. Sir W. T. Makins, Sir W. H. Stephenson (Newcastle-upon-Tyne), Mr. J. A. Bellamy (Plymouth), Mr. W. F. Cotton (Dublin), Alderman Gibson (Manchester), Alderman Hanson (Oldham), Alderman Horrocks (Bolton), Alderman Hind (Bradford), Mr. W. King (Liverpool), Mr. R. M. Mitchell (Glasgow), Alderman Phillips (Salford), and Mr. Corbet Woodall. France is represented by M. Visinet, the President of the Société Technique du Gaz; Germany, by Dr. Bunte; Belgium by M. Brandt, President of the Association des Gaziers Belges; Holland, by Heer P. Bolsius, President of the Dutch Gas Association; and America has three representatives—Mr. R. Norris, the President of the American Gaslight Association, Mr. F. H. Shelton, the President of the Western Gas Association, and Mr. F. S. Richardson, the President of the New England Association of Gas Engineers. There is also an Advisory Committee of ten Gas Engineers, the Hon. Secretary of which Committee is Mr. James W. Helps. As already announced, the Organizing Manager is Mr. F. W. Bridges.

According to the prospectus, it is intended to make the exhibition "the most extensive and comprehensive collection of appliances directly or indirectly associated with the gas industry ever brought together;" and steps are to be taken to ensure the attendance, in large numbers, of the scientific, manufacturing, and general public "from all parts of the globe." European, American, and other manufacturers of gas apparatus are to be invited to exhibit their specialities side by side with British productions; and special facilities are to be afforded to gas companies, corporations, engineers, and all who are interested in the manufacture and use of gas, to inspect all that is latest and best in the gas world, both from the scientific and utilitarian aspect. The exhibition is to comprise eight divisions—Lighting; Cooking and Heating; Motive Power; Applications of Gas to Industrial Purposes; Science in Relation to the Gas Industry; Residual Products of Gas Manufacture, and Accessories; Engineering in Connection with Gas Manufacture, Distribution, and Measurement; and Miscellaneous. Looking down the lists of appliances and plant, they appear to be as comprehensive as it is possible to make them. Further, the Advisory Committee are proposing to hold conferences, lectures, demonstrations, and competitions, and will offer prizes for purposes connected with the advancement of the gas industry. With the object of receiving and discussing any suggestions to render the exhibition successful from every point of view, there is to be a meeting with the Advisory Committee of manufacturers and others at the Holborn Restaurant, next Monday afternoon.

OBITUARY.

In the "Journal" for the 16th of June, 1903, we announced the resignation, by General Hickenlooper, on account of ill-health, of the presidency of the Cincinnati Gas and Electric Company. We regret to learn that the relief which resulted from this step was ineffectual in restoring him to anything approaching his former condition, and that he succumbed on the 12th ult. He had been connected with the supply of artificial light in the city for upwards of forty years. He joined the Board of the Gas Company in 1872, and filled the position of Vice-President before he was elected to the higher office in 1877. When the gas and electric lighting interests were united, he was placed at the head of the concern. Deceased was born in Hudson (Ohio) on Aug. 10, 1837, and he became a resident in Cincinnati in his early boyhood. He held the office of City Surveyor just before the Civil War; and on the first call for Volunteers he organized the battery which bore his name. He advanced rapidly in military life, and was eventually made Brevet Brigadier-General of Volunteers. At the close of the war, he was appointed United States Marshal for the Southern District of Ohio—a post which he held for four years, at the close of which period he was elected City Civil Engineer. At a special meeting of the Directors of the Gas and Electric Company on the 13th ult., the following testimony to the work of their deceased colleague was placed on record: "During his long service, covering a period of thirty-one years, he continued, under all circumstances and conditions, to serve the interests of the Company with all the undaunted zeal and force of his nature. The interests of the Company were paramount to all other considerations; his life ambition being to keep it in the front rank of similar industries throughout the world. The result of his untiring efforts in that direction are evidenced by the brilliant record left behind him as an able gas engineer and manager, a keen financier, and a man of great executive ability, whereby the affairs of the Company have been conducted on a conservative basis throughout his long and successful career in the service of this Company." General Hickenlooper joined the American Gaslight Association on May 13, 1874, and was President in 1882.

THE NEW WORKS OF THE HASTINGS AND ST. LEONARD'S GAS COMPANY.

PROGRESS AT GLYNE GAP.

SECOND ARTICLE.

On the Condenser, Tar, and Liquor Arrangements.

ATTENTION must once again be directed to the space between the west end of No. 1 retort-house and the 9 ft. 6 in. wall marking the commencement, and the site, of the future No. 2 retort-house (see photograph No. 9 published last week). The houses, it will be recollected, will run tandem fashion in juxtaposition to the extensive railway sidings. The quadrangle formed between Nos. 1 and 2 houses is a very convenient space, measuring across from house to house some 57 feet. At the rear is the building alluded to last week, the lower part of which is a continuation of the water-tank under the coal-stores, and above is the foreman's office, the stokers' mess-room, and the men's lavatory. A gangway will (as the scheme develops) be carried over the top, to afford access from house to house; and tracks will be laid upon it to allow of the stoking-machines to travel from one house to the other if necessity calls. But in the centre of this space is now being erected a Clapham condenser, made on the well-known principle of the Keighley firm bearing that name, but specially adapted to meet the requirements of site and make. This condenser can be worked as two sections of 1 million feet each, or the two can be run in parallel; and each section is reversible.

A few words here about reversible condensers. The idea of reversing them has been considered by many as being somewhat novel since Mr. Charles Carpenter's arrangement was described to the Southern Association of Gas Engineers and Managers; but such an idea is scarcely correct, seeing that there has been a condenser on the old works at Hastings with reversible connections certainly over the past decade. This particular condenser was altered so as to enable the reversing of its operation simply for the purpose of making it more efficient; and this is, of course, the root of the object of making a condenser so that its functions can be performed in either direction. By this means, a condenser is kept clean; and while it is clean, it naturally continues efficient. In the ordinary form of apparatus, a condenser does not answer its purpose with constancy, and therefore it does not reduce the amount of naphthalene to the extent that it should do. "Those people," remarked Mr. C. F. Botley, in talking over this subject, "who hope to eliminate naphthalene entirely by using reversible condensers are likely to be very seriously disappointed. It does not require much consideration to see that gas leaving a condenser wherein naphthalene has been deposited cannot be free from it; and it is very little naphthalene indeed which, under favourable local conditions, will give trouble in a district. In some places naphthalene to the extent of 3 to 5 grains per 100 cubic feet will give considerable trouble; whereas the same amount in other districts will not cause any nuisance whatever." This condenser then, has been made reversible in order to have an efficient machine thoroughly under control; but without the hope of entirely eliminating naphthalene with it, notwithstanding that the gas is to be condensed hot. This, it is expected, will enable the condenser to act even more efficiently in reducing naphthalene than otherwise would be the case, as the lighter constituents of the gas condensed in this way are, of course, the best solvents for naphthalene.

Combined with the condenser is an overhead liquor tank for feeding the hydraulic mains in the retort-house; and below the condenser is a tar-tank with liquor separating and tar compartments, which for the present will furnish all the tar storage for the works. It will be possible to run the tar from this tar-well into ordinary railway tank-waggons placed in the coke dock at the other end of the retort-house; and the liquor that is elevated into the overhead tank will be high enough to feed the hydraulics in the retort-house and carry it to the other apparatus requiring a supply of weak liquor.

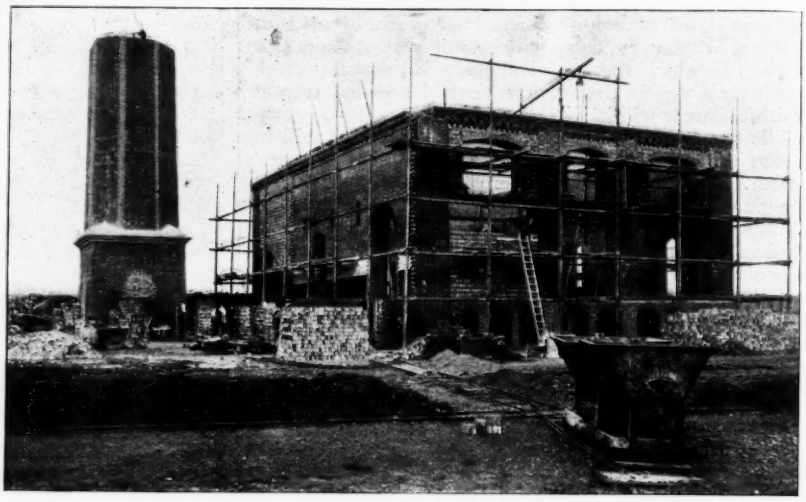


FIG. 10.—THE BOILER-HOUSE AND CHIMNEY, SHOWING PROGRESS TO SEPTEMBER LAST.

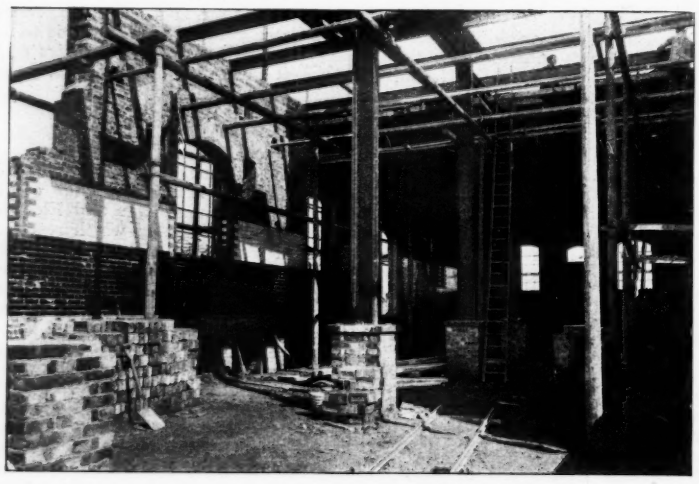


FIG. 11.—INTERIOR OF THE MACHINERY-HOUSE ON APRIL 12 LAST.

THE POWER HOUSE.

From the retort-house, the gas will pass to the condenser through two 18-inch foul mains leading into one 24-inch; and it will leave the condenser through a straight line of 24-inch main laid in a culvert. At the outlet of the condenser, there is a syphon, and next to it an emergency valve, which will be the valve usually employed in shutting down the works. Practically all the tar from No. 1 section will go back through this main to the syphon at the outlet of the condenser, whence it will be pumped up in a tank probably with an electrically driven motor pump, similar to the one referred to in the article last week as having been under trial at the Hastings works.

It should be mentioned here that the whole of the works' mains, which are of 24 inches diameter, have been laid. All the mains required in connection with the new works were supplied by the Birtley Iron Company and the Stanton Iron Company; but many of the connections the Gas Company fortunately had in stock. Travelling along the vacuum main between the condenser to the inlet of the exhausters, we come to the group of buildings seen in the photographs (figs. 10 to 13), and which will be known generally as the "power house." There is the large machinery-house and the boiler-house, with a passage-way between, which will eventually be covered, and in which the steam-pipes, &c., will be located. These buildings are in architectural consonance with the retort-house and coal-store which were described in the series of articles in May and June last year. They are light, lofty, and well-ventilated, and a keen regard has been paid to all present and future conveniences. The machinery house has only been erected to two-thirds of its ultimate length. Above it has been built a canteen, recreation room, and mess-room. The upper floor is interesting, having been constructed of breeze concrete, with expanded metal. This should make the structure comparatively fire-proof, and prevent undue noise in the overhead rooms. The

ironwork used in the building was, or the most part, prepared in the shops at the Hastings works.

In the machinery house (fig. 11), it is observed that some of the beds have already been constructed complete for the reception of the machines which are destined to occupy them. In one part is seen the foundation for a pair of exhausters, each of 60,000 cubic feet per hour capacity, and of Messrs. Bryan Donkin and Clench's make. These will be driven by a steam-engine which is being thrown out of use at the old works. Provision has also been made for an air-compressor here for driving the West combined charging and drawing machines; as well as for a 90 brake horse power Westinghouse three-cylinder gas-engine for producing the electrical energy. A spare air-compressor will also be installed for the supply of the sewage plant when the big compressor is not at work. An overhead hand crane is being fitted on either side of the house. This plant will complete the equipment for the time being; but the days are numbered now when all the machinery mentioned here will be in position.

Passing into the boiler-house, on a thick foundation of concrete, the settings are now being built for three boilers; the bricks which are being used having come from the dismantled retort-beds at the Hastings works. The concrete foundation, it is noticed,

Fig. 12.—Inside the Boiler-House on March 24 last.

has been kept well above the ground-line (fig. 12), and has thus saved considerable excavation, besides providing a cellar or vault in which trams can be run for removing the clinker, &c. At the outset, a boiler, 30 ft. by 8 ft. 6 in., working up to 160 lbs. pressure, dish-ended, of the Lancashire type, and constructed by John Thompson, of Wolverhampton, will be put in; and a smaller boiler, from the Hastings works, is to do duty with it for a period. The new boiler will be fitted with Meldrum's low-grade fuel grate, and also with a superheater of Messrs. Easton and Co.'s type. Adjoining the boiler-house is the pump-room; and this is to be equipped, in the first instance, with a boiler feed-pump by Weir, and an electrically driven pump by Messrs. Blake Knowles, Limited, as well as with the usual accessories. Eventually, in connection with the boilers, there will be one of Green's economizers moved from Hastings, and possibly a forced draught arrangement.

Close by is the chimney stack (fig. 13), which from far-away distances marks the site of the Glyne Works. It is a noble looking structure. At the present time, it is some 106 feet high, and is to be carried up a further 20 feet or so. It will be furnished with a cast-iron cap. The shaft is octagonal in form above the base; and the minimum internal width is 7 feet. It was remarked that the lightning conductor is being fixed as the erection proceeds.

Before leaving this block of buildings, it is convenient to revert to the question of the works' water supply. Throughout the works is laid a domestic or drinking water supply from the Bexhill Water Company's system, together with a works' supply provided by the water gathered from the watershed and impounded in the huge water-tank under the floor of the coal-store. It is possible to supply the works-water main from three points. It can be fed from the underground storage tanks referred to, from the overhead water-tank in the coal-stores, and from the capacious tank seated on top of the boiler-house (see photograph, fig. 13). This tank (which was contructed by the Barrowfield Iron-Works, Limited) has a capacity of 90,000 gallons; and it is supported on heavy girders some 5 feet deep. The water supply to the works, brings to mind the point that an ordinary gas supply will be laid throughout; and that this will be supplemented later on by a fuel-gas supply. This, however, will follow the erection of the carburetted water gas or other similar plant.

The Purifying Plant.

Within a short distance of the power house, we come across the foundations for certain of the plant in which the mechanical purification of the gas takes place. There is one bed ready for the accommodation of a Pelouze and Audouin tar-extractor by Messrs. W. C. Holmes and Co., and a complete purifying machine by Messrs. C. & W. Walker, Limited; and near by is another for a scrubber-washer from the old works at Hastings, and brought up to date by Messrs. Kirkham, Hulett, and Chandler. These machines are each equal to treating 2 million cubic feet of gas per day. There is also space left for a spare machine on the same line and connections. The 24-inch pressure main is laid in straight lines throughout the works; and, from the site of the plant, to which allusion has just been made, it runs along the face of the purifier-house to the east end, where the Contractors for the purifiers (Messrs. Newton, Chambers, and Co.) pick it up. The purifiers are in an interesting stage of construction; and it is now possible to see clearly the design, and remark the completeness of their detail. At the time the last series of articles was written, many of the points had not been determined; but now everything has been settled, and the work, as will be shown, is now going forward with a good swing. There are several interesting features about the plant worth special description and illustration.

The house is situated close to the north boundary wall; the space between the building and the wall forming a passage-way, which will be covered, and will contain the 30-inch main which runs from here to the Hastings gasholders. The chief idea in covering-in this passage is to prevent the direct escape as far as possible of any evil smell caused by the lime purifiers during the emptying operations. The covering will cause the whole of the effluvia to pass to the louvre in the roof of the centre bay, and thus it will speedily become adulterated, and be carried away by the current of ascending air. The house, of course, is only being partly built at present; but eventually it will consist of three bays—the two outer ones being of small, the middle one of larger, span. The two outer bays will each contain a row of elevated purifiers, and the middle one a lime and filling floor (built of concrete and expanded metal) on a level with the tops of the purifiers. Only the northern row of purifiers, for dealing with the gas from No. 1 section, is at present being constructed; and consequently only the span of the house for the accommodation of these, together with the central floor, is now being erected. The front bay will follow when the development of No. 2 section of the works is taken in hand. But what is now being done in connection with the purifying plant is only a part of the whole, and cannot be described without bearing in mind what is to follow hereafter—as the scheme of the building, to realize to the full the conveniences of the arrangements, must (now that it has been started on these lines) be ultimately carried out in its entirety. However, meanwhile a drawing is given showing the elevation of the house as it will appear when the plans are consummated; and there is no doubt that there will be a consensus of opinion that the elevation is a good and attractive one.

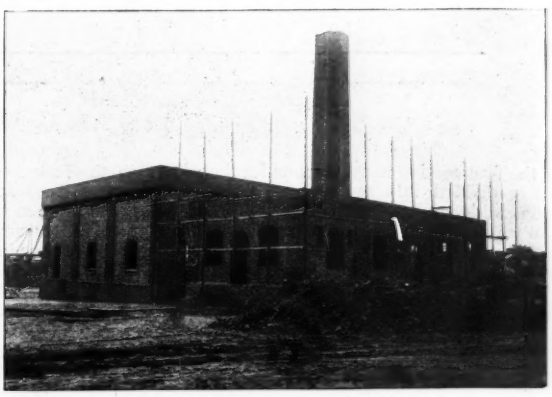
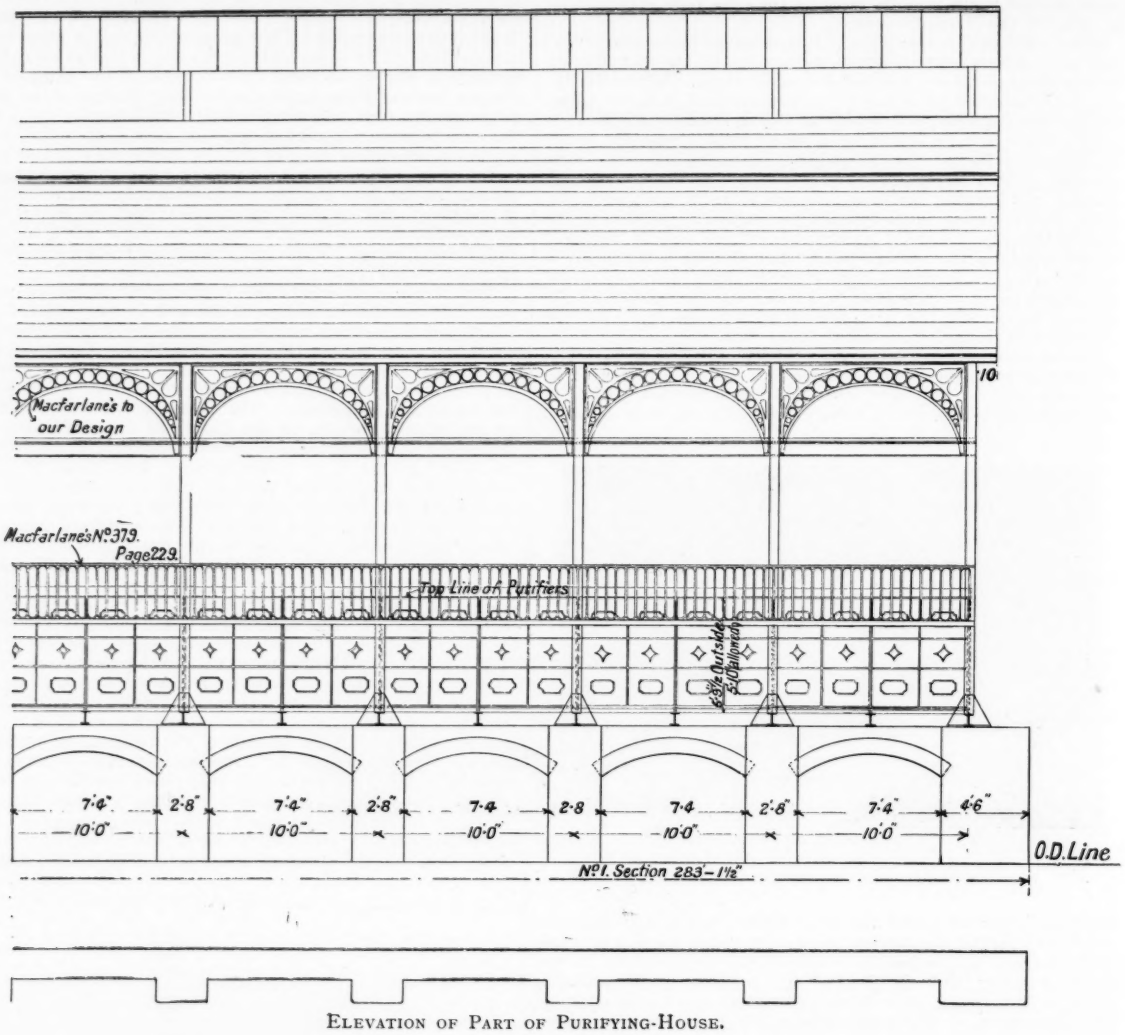


Fig. 13.—The Boiler-House (with Overhead Water-Tank, Machinery-House, and Chimney), on April 12 last.

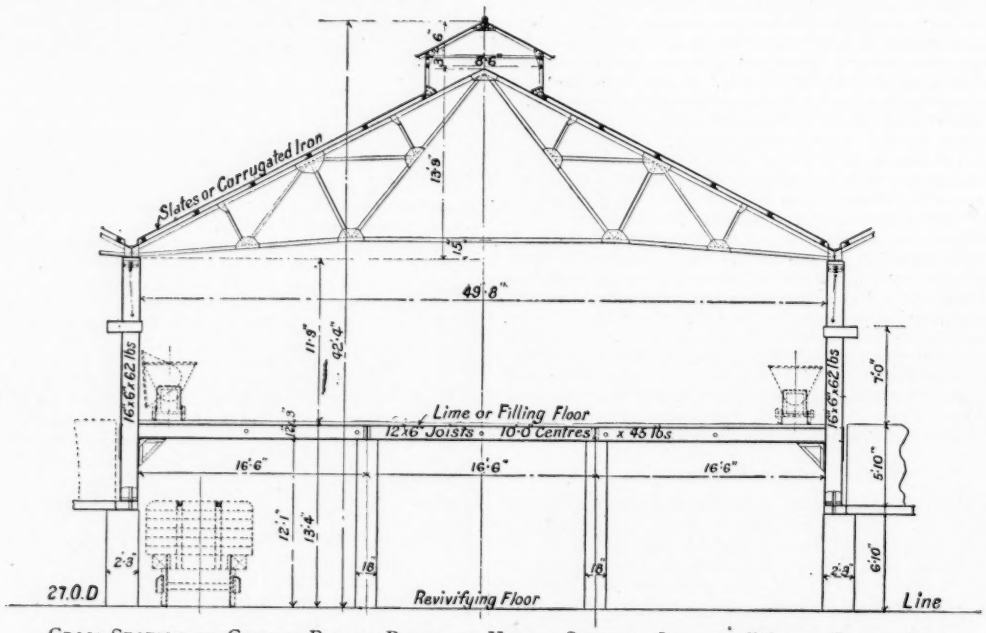
To deal first with the building. The purifiers (which will be described presently) are erected on a staging of 8 in. by 6 in. joists, braced longitudinally, and supported by light cast-iron columns. The staging is carried on a brick wall on the north side, and on a series of brick arches elsewhere. The roofs, together with the crane for lifting and moving the covers, is carried by vertical stanchions, consisting of 16 in. by 6 in. rolled steel joists; and one row of these serves to support 12 in. by 6 in. cross joists, which form the essential portion of the lime (or central) floor. These joists in turn are supported by two rows of brick arches, some 6 feet higher than the other arches which carry the staging. The lime-floor is about 50 feet wide, and, of course, it will serve both sections of purifiers. It is covered with a roof, which will have a louvre, probably fitted with Rendle's glazing, as in the case of the retort-house and coal-stores. The trusses in each case are of a simple latticed type, formed of flat members and angles riveted; and it is a point of interest to note that they were delivered by the Contractors in two pieces for erection on the site. It has not yet been definitely decided whether the roofs will be slated, or covered with galvanized corrugated sheet-iron. Although designed for slating, there is a considerable expanse to be covered, and expense has to be considered.

It is seen that the range of purifiers now under construction

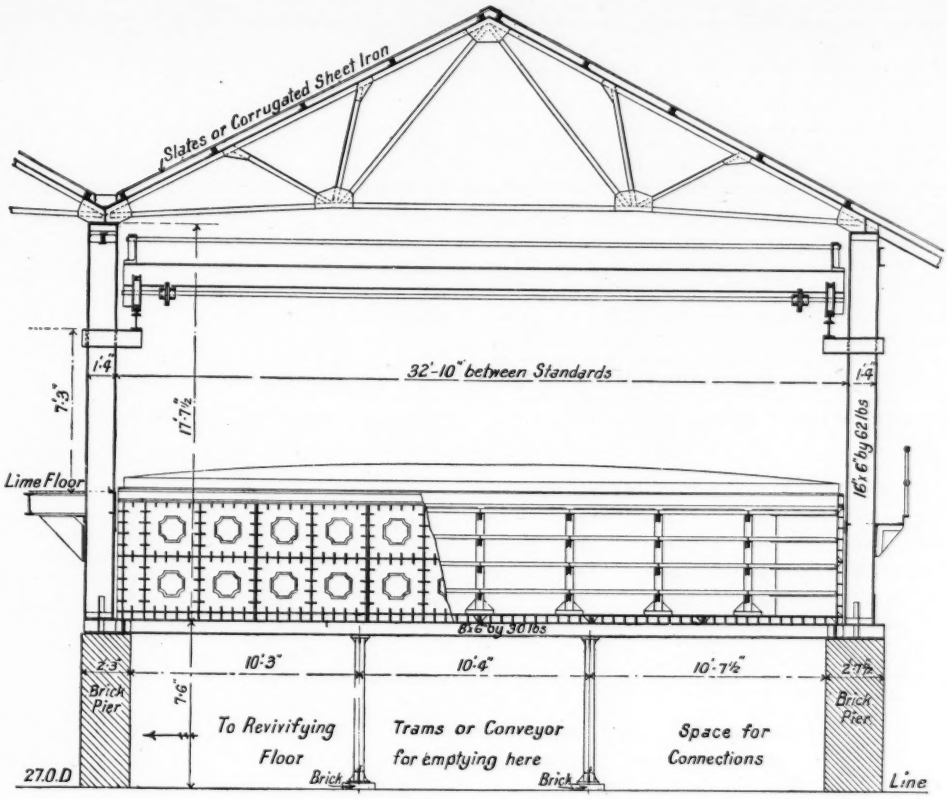

Macfarlane's to our Design
Macfarlane's No. 379. Page 229.
Top Line of Purifiers
7'4" 2'8" 7'4" 2'8" 7'4 2'8 7'4 2'8" 7'4" 4'6"
10'0" 10'0" 10'0" 10'0" 10'0"
O.D. Line
No. 1. Section 283'-1½"

ELEVATION OF PART OF PURIFYING-HOUSE.

for the first section is continuous for the whole length of 280 feet, and is divided into seven boxes of 40 feet each. These are 32 feet wide, and 5 ft. 6 in. deep. The seven boxes are one more than was originally intended, or, as a matter of fact, is necessary; but it has been adopted with the object of being absolutely on the safe side in regard to the catch-box. When the works are more fully developed, there will be no need for the extra box, as there will be another section of purifiers to fall back upon; but as it was essential to be quite certain in respect of the purification of the gas from sulphuretted hydrogen, without the help of the Hastings works, it was determined to incur at the outset the additional expense by providing the seventh box as a precaution. The cover for each 32 ft. by 40 ft. box will be in two pieces, each weighing about 4 tons. Here we come across one of the special features of this new plant. With the co-operation of the Contractors, a very successful form of holding-down bolt has been evolved; and

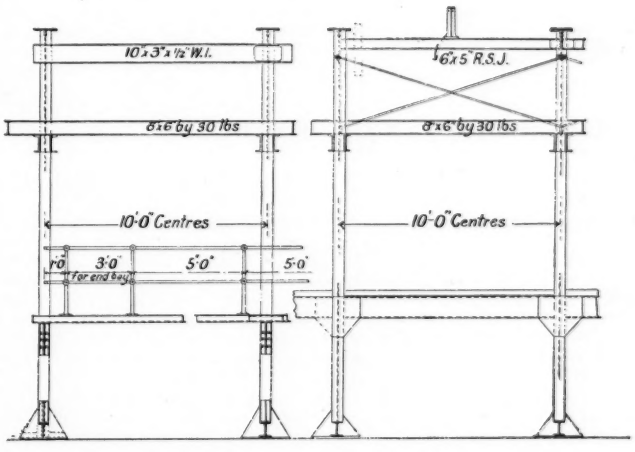


CROSS-SECTION OF CENTRE BAY OF PURIFYING-HOUSE, SHOWING LIME OR FILLING FLOOR, &c.



CROSS SECTION NORTH BAY.

the fact that the covers are in two parts will now, through this device, cause no obstruction in the boxes. The top or jointing flange is of unusual shape. It is 1½ inches on the top or bearing surface, widening out to 1¾ inches, where it joins the body of the plate, and on the under portion of the projecting side it is bevelled. This bevel enables side bolts to be used, and brings the whole of them, when the nuts are screwed down, fairly straight, and also prevents the bolts twisting, during the operation of screwing up, apart from the square with which these bolts are provided, and which engages with the hole in the flange of the cover proper. When it is desired to remove the cover, the bolts are simply slackened and turned outwards, and, when the cover is being replaced, the bolts, engaging with the flange, assist to guide it into position. The cover is of somewhat novel construction. It is about 6 inches deep, of box-lid form, and with a flange projecting outwards all round. It has secured to it a rubber jointing of Messrs. Newton, Chambers, and Co.'s ordinary form, with projecting brackets inside the cover, which permit it to be stood on the other covers without risk of the jointing being injured, because the whole of the bolts and jointing are carried up with the cover when removed by the overhead crane. The cross connections with the curb have been got over in rather an ingenious manner. As the two flanges of the covers come side by side, the curb in one case is readily attached to the divisional cross plate, but in the other case, it has to be adapted to the top of the grid bearer standards. The drawings clearly show the novel features of these connections and other parts.



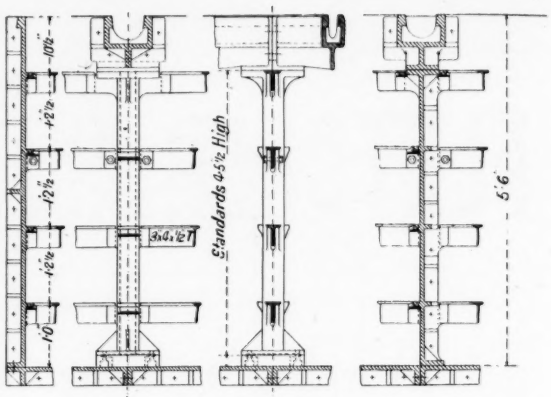
ELEVATION NORTH SIDE ELEVATION SOUTH SIDE

Each box is provided with two shoots for emptying from the bottom, and two side openings for emptying direct into railway waggons, running through the outside bay of the building. The cross connecting-pipes underneath the bottom of the purifiers are so arranged as not to interfere with the head room. All the connections will be located within the north bay, leaving a perfectly clear way between the bottom of the box and the ground floor, which will be used for revivification or slaking lime or anything of this sort. In connection with the bottom shoots for removing the spent material, there is what appears to be a modification of something that has been done in other works. It is an inside emptying shoot. It was first designed in the ordinary way; and, as time permitted, it was compared with what had actually been done elsewhere. In some cases, it was found that this inside shoot was made in one piece, and was somewhat cumbersome to remove. What is apparently an improvement has therefore been made. The shoot is constructed in sections; each section playing a part in supporting the grids. The sections are socketed together; and this prevents the short-circuiting of the layers. The top layer of material hides the shoots entirely; but when the cap of the shoot is removed, it will enable both the top and second layers of material to be emptied out. There are two of these sectional shoots to each box.

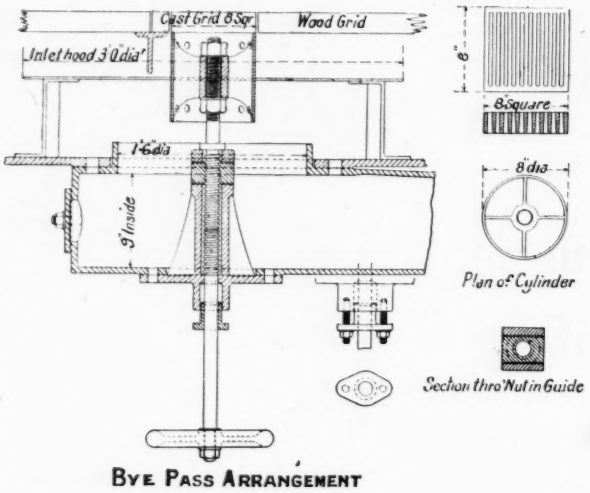
The arrangement of the valves and their connections is somewhat elaborate; but in its selection regard has been had to the ultimate possible uses of the purifiers—if, for instance, general legislation enables the Company to do without sulphur purification, about which, while inspecting the work proceeding at Glyne, the writer came to the conclusion that Mr. Botley holds sapient views. However, the lime boxes are arranged so that they can be worked in rotation or otherwise, as may be required; and it will also be possible to bye-pass any box in any position, on the rotative system. This has, at times, in the experience of Hastings, been found to be desirable. Bye-passing the bottom layer of each box has also been provided for in the inlets. The arrangement is simply a piston-shaped valve, working with a screw and stuffing-box, and operated from below the purifier. Over the piston piece (which is some 8 inches in diameter) is a square piece of cast-iron grid, occupying a space cut out of the ordinary grid immediately above. In normal working, this grid is covered with the purifying material in the usual way; but should it be necessary to bye-pass the bottom layer, all that has to be done is to screw up the hand-wheel which raises the piston piece, and with it, of course, the grid on the top. The lime or other material naturally falls off; and the circular piston piece prevents it littering down below, and also provides an easy means for the gas to escape to the top of the layer—the piston piece being provided with holes, so that should any material remain on the grid, there is still an outlet for the gas. This is a very simple

contrivance; and it is believed by Mr. Botley that it will answer all practical requirements, and add to the efficiency of the purifiers, because, if there is any caking, it is generally the bottom layer that is affected. All these interesting points are illustrated in the accompanying drawing.

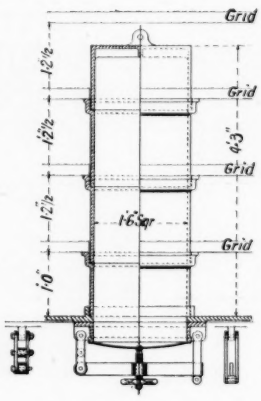
So far as can be judged from the portion of the house and plant now erected, everything is working out satisfactorily in accordance with the general plans and ideas of the Engineer. All the steel constructional work strikes one as being excellent in every respect. Reference was previously made to the covering-in of the roof; and it is probable that this will not be done this season. For next winter, temporary arrangements have been made for slaking the lime and filling the boxes. The arches for the lime-floor adjacent to No. 1 section of purifiers have been put in, so as to form a landing from which to fill the boxes. It will be remembered that, in the general design, as explained in the first series of articles, the central, elevated landing or filling floor is level with the top side plates of the purifiers, so that the material can be wheeled straight in. But, at the outset, a tramway is to be laid from the shed to be used temporarily for slaking lime, to the floor beside the boxes. This will enable the trolley-waggons to carry the material up, and to be tipped directly into the boxes. It is



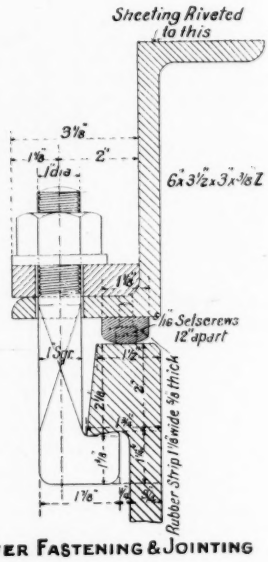
DETAILS RE CURB



BYE PASS ARRANGEMENT



INSIDE EMPTYING SHOOTS



COVER FASTENING & JOINTING

Mr. Botley's experience that lime purifiers cannot be charged properly by automatic means; it must be done by barrow and hand.

General Notes.

It has already been mentioned that in the covered way formed between the purifying-house and the northern boundary wall, will be the 30-inch trunk main, which will carry the gas from here to the gasholder station (now the old works) at Hastings. In passing from the purifiers, the gas will be registered by a "Rotary" meter of 100,000 cubic feet per hour capacity. The gas will be pumped into the main at Glyne by exhausters; and will be drawn from the other end of the main at Hastings—a distance of some 4 miles—by exhausters, and sent into the holders. At the present time, in the Hastings works, the character of the arrangements for drawing the gas from the main can be seen. The ends of the mains, valves, and connections have been placed in an underground chamber built of concrete; and over this chamber a house is to be erected for the accommodation of the gas-engine and steam-engine and exhausters to be used for this special purpose. This plant is part of that which will be thrown out of use on the abandonment of gas manufacture at the Hastings works.

In the first series of articles it was mentioned that the parliamentary estimate of the cost of the first section of the Glyne works would be about £100,000. This remains good. But coincident with this expenditure, there has been certain outlay incurred on account of section No. 2. Here and there throughout the works, there are plant and work that necessarily, in the interests of ultimate economy, had to be provided and undertaken straightway, but which are in part of and for the second section, and will contribute towards the easing of the expenditure on it when the construction is taken in hand. We find this to be so in the purifying and other portions of the works. In a works of this character, it necessarily follows that commencing on a virgin site, the initial work must, in a measure, be more expensive than that which follows; and consequently it is far from surprising to learn that the expenditure on the first scheme will amount to more than the £100,000 estimated for section No. 1—perhaps to £7000 beyond. But, generally speaking, it may be taken that the excess applies to future work executed at once for

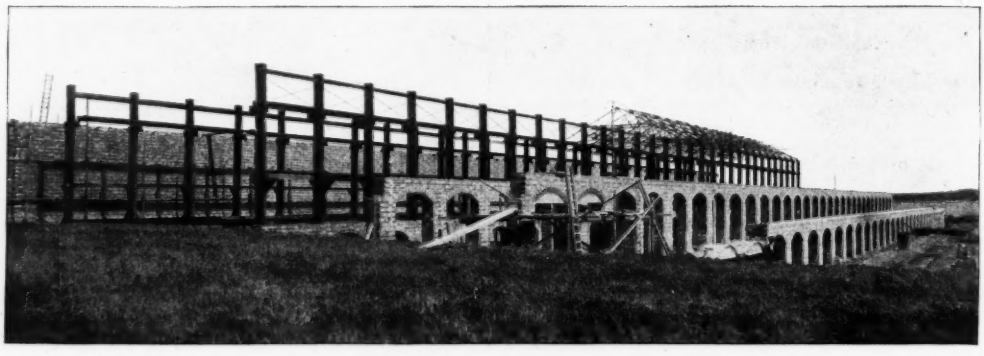
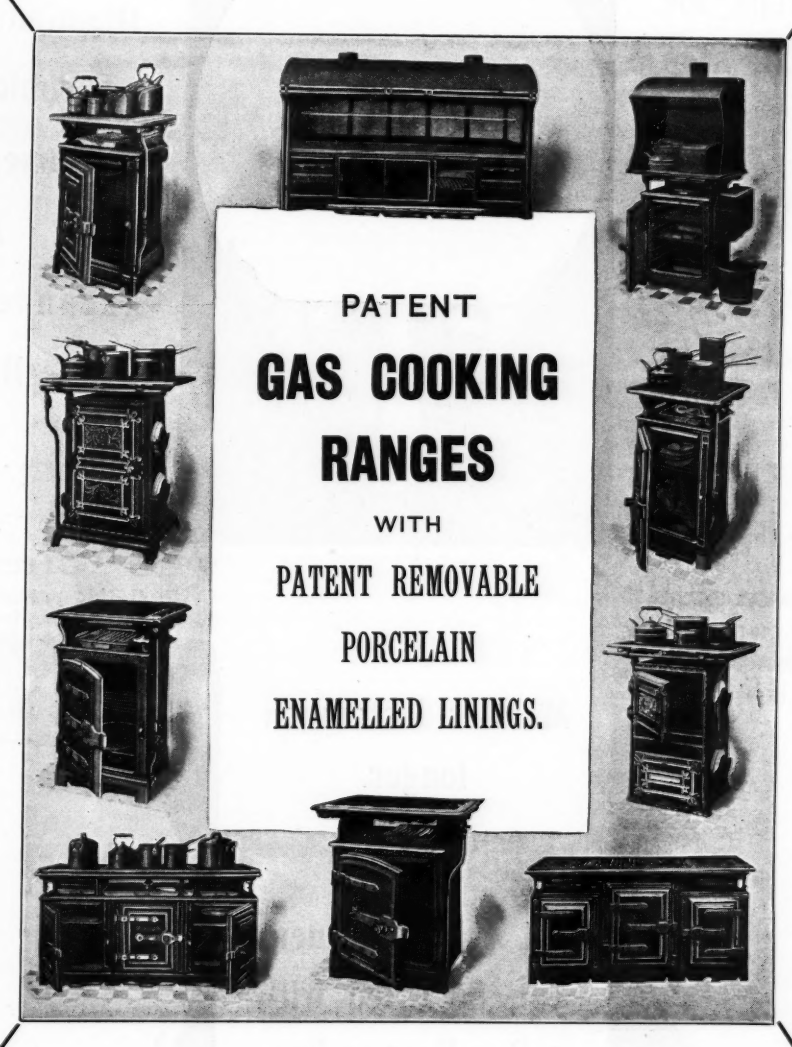


FIG. 14.—THE PURIFIER-HOUSE—THE POSITION ON APRIL 12 LAST.

(Showing the Arches for the Stages, and the Steel Superstructure for No. 1 Section.)

FLETCHER, RUSSELL, & Co. LTD.



SHOW-ROOMS: *134, Queen Victoria Street, LONDON, E.C.*
130 & 132, Deansgate, MANCHESTER.

WARRINGTON, MANCHESTER, & LONDON.

WILLIAM SUGG'S NEW PATENT

INCANDESCENT GAS-BURNERS

No Chimney to break.
No Perforations for Dust or Dirt to stop up.

Steatite Burner Head, Incorrodible and Unaffected by Heat or the Action of Gas.

The "Christiania."

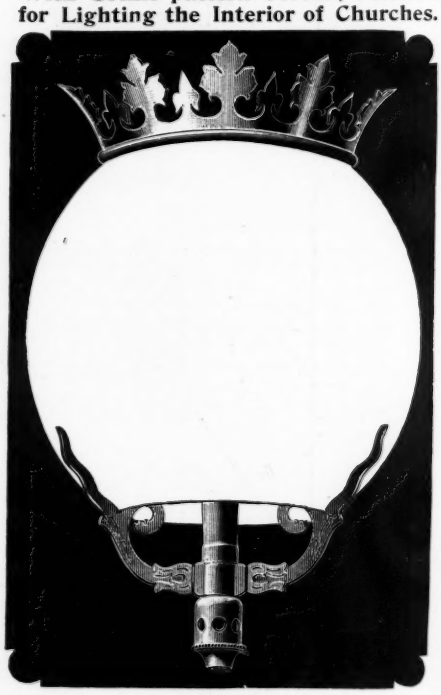
Develop a Higher Illuminating Power per cubic foot of gas consumed than any other low-pressure Incandescent Gas-Burner.

The "Diamond,"
Fitted with No. 3011 Glass.

Mantles last much longer.

All these Burners can be fitted with a Bye-Pass or Bye-Pass and Chains, if required.

The "Christiania,"
With Gothic pattern Corona, suitable for Lighting the Interior of Churches.



For further Particulars and Prices, please write for No. 1 Catalogue.

WILLIAM SUGG & CO., LIMITED.

VINCENT WORKS,
WESTMINSTER, S.W.

convenience and economy. And that is clearly good and prudent expenditure.

The offices, stores, and other buildings at the main entrance of the works are being pushed rapidly on; and probably next year the Company will proceed with the erection of the first part of the workmen's dwellings on the extramural ground to the northern part of the Glyne site.

This is a general survey of the new works at Glyne Gap to the position at which they have arrived; and it must be said, with their development, that the excellent impression made as to the lines on which the Engineer has dealt with the site and the design of the works for his special circumstances, is confirmed. A few months hence, as already stated, a commencement will be made with the manufacture of gas at the new works, and then will be opened a new chapter in the history of the Company. The proprietors and consumers must not, however, expect to immediately see any great financial effect from the first production of gas at the new works. It will, in the ordinary course of things, take a period for the working under the new conditions to settle down into a state of regularity and order, and for the men to get accustomed to their new surroundings and operations; and this stage does not benefically affect working costs. But after that, it must be that economy will begin to accrue. However, there are two parts of the population of Hastings who will immediately benefit on the closing down of the old works. They are the people who reside in the houses on all sides of the cramped works at Hastings and those of the Company's employees who are engaged in the manufacturing operations. Their conditions will be immensely improved. Successful as has been the Hastings Gas Company in the past, we shall look for still greater progress—as marked by the reduced cost of manufacture, the lower price of gas to the consumers, and the continuous growth of the stability of the concern—as the years pass after the Company's producing operations have finally been established at Glyne Gap.

SLOW COMBUSTION OF ETHANE.

At a recent meeting of the Chemical Society, a paper on the above-named subject was submitted by Messrs. W. A. Bone and W. E. Stockings.

The authors have studied: (1) The interaction of ethane and oxygen at from 250° to 400° C., under pressures of 1·75 to 2·33 atmospheres, in borosilicate glass bulbs; (2) the oxidation of ethane in contact with a surface of porous porcelain at from 400° to 500° C., under reduced pressure, in the circulation apparatus described in a previous paper; and (3) the slow combustion of ethyl alcohol and acetaldehyde. The main conclusions deduced from the experiments are as follows.

1.—The proportions of ethane and oxygen most favourable to chemical change are equimolecular (1 : 1), though interaction takes place nearly as rapidly in mixtures containing ethane and oxygen in the ratio 2 : 1. At all temperatures, ethane is oxidized much more rapidly than methane, other conditions being equal.

2.—When ethane is treated with proportions of oxygen insufficient to oxidize the whole to carbon monoxide and steam, there is no preferential combustion either of hydrogen or carbon. In the absence of secondary phenomena, the interaction is always marked by a diminution in the pressure of the cold products without any deposition of carbon or liberation of free hydrogen.

3.—The combustion proceeds in several well-defined stages, among which the following have been distinguished: (*a*) A primary oxidation to acetaldehyde and steam. (*b*) A further rapid oxidation of the acetaldehyde to formaldehyde, carbon monoxide, and steam. (*c*) The final oxidation of formaldehyde to carbon monoxide, carbon dioxide, and steam, which may best be considered as due to two simultaneous interactions—(1) $CH_2O + O_2 = CO_2 + H_2O$; (2) $CH_2O + O_2 = 2CO + 2H_2O$.

4.—The combustion of the hydrocarbon may be accompanied by the following secondary phenomena: (*a*) Hydrogen or methane, or both, may appear in the products without any liberation of carbon, as the result of the purely thermal decompositions of formaldehyde and acetaldehyde vapours respectively; the latter giving rise to methane and carbon monoxide, while the former yields hydrogen and carbon monoxide, though its decomposition is a more complex process than that of acetaldehyde. (*b*) Small quantities of ethylene and hydrogen may appear in the products as the result of the thermal decomposition of ethane. (*c*) If the heat liberated during the initial stages of oxidation is sufficient to raise the temperature of the interacting gases to the ignition-point, an explosion takes place, during which the excess of hydrocarbon, and probably also of aldehyde vapours, is decomposed; carbon and hydrogen being liberated, together with some acetylene and ethylene. There is no liberation of carbon below the ignition-point.

5.—Though ethyl alcohol has not been detected among the oxidation products of ethane, its absence may be explained by the fact that it is oxidized far more rapidly than is ethane under similar conditions.

6.—The view taken of the mechanism of the combustion of ethane is supported by the experiments on ethyl alcohol and acetaldehyde.

FREDERICK SIEMENS: PYROLOGIST.

The announcement of the death of Frederick Siemens, which appeared in last week's "Journal," arouses many reflections. This is not the place for a biographical notice of one of the most distinguished of the Birmingham medalists of the Institution of Gas Engineers—a meed of recognition of his great and particular services to the gas industry which came to him in 1884. The mind which is now stilled, however, was of such extraordinary and wonderful power, that it is impossible to record the dissolution of the body which held it—full of both years and honours—without devoting some observations to a few of its most conspicuously victorious wrestlings with the powers of Nature.

Frederick Siemens belonged to that great company of pioneers that number Newcomen, Watt, Murdoch, George Stephenson, Telford, Bessemer, and a few others living and departed—the men who founded new industries, and who, penetrating the secrets of Nature, came forth with its spoils in their hands. It was not so much that Frederick Siemens invented the regenerative gas-lamp called by his name, his hard glass, the regenerative gas-furnace, and much more that would be better known for his work if he had been personally more assertive. The most remarkable aspect of his pioneering consisted in the masterly spirit, amounting to genius, which inspired him first to perceive where a natural secret lay hidden, and then to discover and make use of it. In at least two instances of the very first importance, Frederick Siemens flew in the face of all the laboratory men who profess and call themselves scientific, and think themselves therefore competent to lay down the laws of physical things for others. The generation of such men is persistent, while the genius that can rise superior to them is rare. It is for the purpose of bringing into prominence this quality in Frederick Siemens, for the encouragement of workers of the same order, that this notice of a truly great pioneer is written.

The first stroke of genius which Frederick Siemens made in this way was with his carbonic oxide gas furnace. Before his time, not only was there no gas firing of this kind, but the science of the day did not hold out the slightest encouragement of the economic possibility of any. Take the evidence on this head of that old guide of so many students of practical Heat—Thomas Box, who founded himself chiefly on the work of the French school of experimentalists, Péclet, Regnault, Dulong, and the others. He, writing in 1868, ten years and more after Siemens had begun his most fruitful labours, knew nothing of gas firing. His tables showed that to burn carbon in the two stages—first to carbonic oxide, and then the carbonic oxide to carbonic acid—would give a result 33 per cent. inferior to that of burning the carbon directly to carbonic acid. Such a statement, whatever its laboratory truth, was enough to block the way to anybody who might have thought of experimenting in this direction. If ever there was a scientific "No Thoroughfare" notice posted over any possible opening for the improvement of an industrial process, it was in this "classical" exhibition of the wastefulness of burning carbonaceous fuel in two stages instead of only one. Frederick Siemens simply disregarded it, with what results need not be specified.

Again, at a later period of his history, when this daring innovator was giving his attention to the subject of burning illuminating gas to the best advantage in regard to the development of light, he did what he wanted to do by simply applying to this object that principle of returning to a source of heat as much as possible of the sensible heat carried off by the combustion products, which was a familiar tool in his hand. But if he had stopped to pay respect to the deliberate finding of the scientific authorities of the day, he would never have made the attempt; for it was reported in 1880, by a Committee of the British Association (confirming an earlier report of the London Gas Referees), that no appreciable improvement of the light produced was obtainable by heating the gas, and that though heating the air supply to the flame had a slight effect in this sense, the principle was not likely to be adopted for general lighting purposes, because "the additional light which any practicable amount of heating would cause to be obtained would probably not compensate for the extra cost and trouble attending the use of the required apparatus." It is a striking illustration of the weakness of laboratory science in face of the larger truths of Nature, that the same volume of the "Journal" which contains this dogmatic "No Thoroughfare" contained the first particular description of the Siemens burner, which showed an improved illuminating effect of 3 to 1 when compared with the "London" argand.

It is not given to many men to force two such closed openings, barred by presumptive pedantry against inquiring minds. Such records ought to render men of the laboratory and the lecture-room a little less confident that all knowledge reposes in themselves. On the other hand, obviously, all ardent pioneers are not Siemenses. He triumphed over the pedants of his day, not because of his want of respect for such science as lay athwart his way, but by reason of his greater grasp of the conditions of progress. Nobody can tell precisely how such a mind as that of Frederick Siemens operates, not even the man with whom it is identified as part of a personality. He was at any rate an indefatigable worker. Whatever the suggestion that moved him, he was undaunted in experiment. If he was able to see a little farther than most into the unpenetrated places where Nature

keeps her prizes, and possessed the gift of going the right way to work, as he used to say of himself, to accomplish what others regarded as impossible, he certainly had that other mark of genius —an infinite capacity for taking pains. His success was due, so far as an observer can appreciate the conditions, chiefly to knowing what it was best worth his while to take pains about. This is the incommunicable knowledge which no mere teaching can impart, nor academic degree indicate. Of course, he made a host of mistakes in the course of his pioneering. Not all journeys are fruitful of discoveries; but at least of Frederick Siemens it can be said that no man could show him a way. He was, of all things, a "doer;" and the labouring world is vastly richer to-day for his deeds. He was a great worker, in whom there was neither guile nor littleness.

ELECTRIC LIGHTING MEMORANDA.

The Accounts of the Electricity Department of the Corporation of Bolton—The Questions of Depreciation and Policy—The Case of Tunbridge Wells—Effects of a Tramway Traction Load.

THE accounts of the Electricity Department of the Borough of Bolton for the past year are calculated to give unalloyed satisfaction to the burgesses, who will be able to see in them ample proof of the solvency and profitableness of the Corporation undertaking. The most salient feature of the accounts was mentioned appreciatively in last week's "JOURNAL." This was the way in which the Committee have treated the claims of depreciation of the assets; and on the present occasion the particulars can be adequately stated. The Bolton electric supply undertaking was started in 1895-6, with an initial capital outlay of about £40,000. At present it represents a gross capital expenditure of £241,800, which includes a new tramway traction branch. The amount of business done is such as to reduce the capital per kilowatt sold to less than £48. Of the gross capital, £41,298 has been repaid or depreciated, leaving £200,502 chargeable to the business. The works costs of the unit have been brought down to 0·581d.; and the total costs, inclusive of 0·287d. for interest, and 0·516d. for depreciation, amount to 1·51d. per unit. The grand average price obtained for all purposes was last year 1·77d. per unit. Private consumers paid per unit, 3·44d.; public lighting, 3·32d.; motors, 1·23d.; tramway, 1·25d. The total net revenue obtained at these prices was, for private lighting, £17,172; public lighting, £131; power, £3843; traction, £16,136. Finding themselves in receipt of revenue amounting to £39,309, against expenditure £14,913—thus securing a profit balance of £24,395—the Committee were in a position to make a very gratifying division of benefits.

There was a balance from the previous year of £1324, which made up the credit side of the profit and loss account to £25,719. Out of this came, as the first charge, £6047 for interest on the mortgage debt. Next followed the claims of "depreciation"—word of fear, abhorrent usually to the municipal trader's ear. But it is easy to be a financial purist when one has the means. The Committee boldly charge their estate with depreciation after the rate of 6 per cent. on machinery, mains, and transformers; and 10 per cent. on accumulators, meters, motors, and instruments. The total amount is £10,868. Out of this, eventually, is taken the repayment of loans, which leaves an available balance of £7979. Whether or not this is sufficient is a matter for those who advised the Committee in respect to the fixing of the rates. Assuming it to be so, there is no more to be said on the point. There remains, out of the profit balance, an amount of £6818 handed over to the district funds in aid of rates; and £1986 is carried forward, which is a larger sum than the previous remainder. As to the former of these two amounts, it is, one must suppose, of the nature of a sop to the ratepayers as a body, and quite in accordance with the local way of regarding such matters. It is not an excessive burden on the capital, as things go; being not much more than the interest paid. But at the same time, it would be wise on the part of the Corporation to consider whether it would not be of greater benefit to the community, as a whole, to return all surpluses into the business.

Let us consider this point a little with special relation to our Bolton friends, who have so fairly met our criticisms of an earlier period in regard to the matter of depreciation. An electricity supply undertaking, like a gas or a water works undertaking, or tramway, exists for the benefit of the whole town. The capital necessary to establish and carry it on is borrowed on the security of the rates; but all the charges due to capital are paid by the users of the service. All the cost to the rate fund, in the circumstances, is represented by any excess of the rate of interest payable on the municipal loans generally, by reason of their larger proportion to the rateable value and the fact of some of the money being employed in trade, as compared with the cost of borrowed money in other circumstances. That is to say, assuming that Bolton, as a municipal trading town, has to pay 1 per cent. higher interest on the whole of its borrowings than it would have to pay if the total indebtedness were less by the sum of trading capital, it would then be fair that the various trading enterprises of the Corporation should recoup the municipal treasury by this amount. All the rest of the trading profit would do the town, as a whole, more good if employed for the benefit of the services themselves. There is another way of looking at the subsidy to the rates. Calculated as a percentage on the actual expenditure for carrying on the concern—outgoings on revenue account, interest, and depreciation—it shows that Bolton charges its customers for the conduct of this particular business "on-cost" amounting to 21 per cent., which is pretty heavy. On the working expenses only, the "on-cost" figures up to 50 per cent., which is exorbitant. Yet once more. Interest on loans, sinking fund, renewals, and ratepayers' subsidy amount to £23,700 out of a gross revenue of less than £40,000. From this point of view, the consumers have not much to rejoice over in the fact that the supply is municipal.

Last Thursday's "Pall Mall Gazette" took note of the news that Tunbridge Wells has had quite enough of municipal trading, as shown by the decision of the Town Council to stop spending money on extensions. It is remarked that the telephone experiment has not been forgotten; and the history of the electric lighting of the town does not read much better. "In eight years the system, which cost £80,000, has contributed to the rates the magnificent sum of £2750." This is what is described as remunerative municipal enterprise. But this is not the worst. "Over this dazzling success, a cloud has begun to arise through local tradesmen giving up electric light for incandescent gas, and the remedy proposed by the municipal traders was, of course, to bolster up the undertaking with a further application of public money. Tunbridge Wells, however, seems to have learnt its lesson, and prefers in the meantime to turn its rates to other purposes than those of industrial speculation." Clearly, Tunbridge Wells is no Bolton. The full bearings of this observation may be left to sink into the perception of the reader, who will interpret it according to taste. It is only the pedants of Municipalism who affect to ignore differences such as those which exist between a busy, thriving manufacturing town in the North of England, and one of the most charming of old-world "inland watering-places" of the South. What is good for one in the way of municipal enterprise is not necessarily practicable or reasonable in the case of the other. Tunbridge Wells has no tramway traction branch to help pull down the cost of the unit. There is, in point of fact, something remarkable about this very popular traction load, which the experts in the business aver to be of little real profit to an electric lighting station, while it is nevertheless widely sought after by corporation electricity departments. It is probably true that the combination of tramway traction and lighting is only really desirable where, as in the case of Bolton, the cost of generating current is particularly low. A capital of £50 or thereabouts per kilowatt, and working costs of considerably less than ¾d. per unit, enable the undertaking so well circumstanced to do electric lighting or traction, or anything else in that way, with equal prospects of advantage to all parties concerned. Such fortunate concerns are extremely rare, however; and it is therefore rash to base any general conclusions upon them in the way of encouragement of other places to go and try their luck in the same line. This is what has happened too often, with disastrous results.

THE WORK OF THE PATENT OFFICE.

The New Search Scheme.

PERHAPS the most interesting feature of the report for 1903 of Mr. C. N. Dalton, the Comptroller-General of Patents, Designs, and Trade Marks, is the reference it contains to section 1 of the Patents Act, 1902. This section, it may be remembered, will place upon the staff of the Patent Office the obligation of ascertaining, in the case of every application which reaches the complete stage, whether the invention sought to be patented has been wholly or in part described or claimed in any prior specification, other than a provisional not followed by a complete specification, published in this country during the preceding fifty years. If it is found that the invention sought to be patented has been so claimed or described, the applicant will be informed of the fact, and will have the opportunity of amending his specification so as to confine it to so much of his supposed invention as he may desire to patent in view of the specifications to which his attention has been called by the office. The provision, however, is not to come into operation until a date to be fixed by the Board of Trade; and it will, of course, apply only to applications made after that date.

The first step to be taken towards formulating a scheme for conducting the proposed new examination, was naturally the visit of a deputation to Germany, so as to study the methods of the much-praised Patent Office in that country; and this was followed by the appointment by the Board of Trade of a Committee to consider what arrangements and changes should be made in the staff of the English Patent Office in order to meet the additional work that will devolve upon it. Some idea of what the extent of this extra labour will be may be gathered from the fact that the Committee recommended the appointment of another 92 assistant examiners. As the result of the visit to Germany, and an inquiry into the practice in force in the United States Patent Office, a proposal was laid before the Committee to arrange the whole of the specifications and abridgments for the past fifty years in such a manner as to afford the readiest means of access for the purposes of the official search, by mounting the abridgments and drawings on cards, and attaching the specifications themselves to

the cards. This suggestion, which has been adopted, involves the preparation of some 600,000 cards; and such rapid progress is being made with the work that it is hoped the Board of Trade may be justified in putting section 1 of the new Act in force with the commencement of next year. After that date, therefore, an inventor should—if, as will no doubt be the case, the search is carried out thoroughly—have reasonable ground for regarding his patent as some guarantee of the novelty of his proposal, without having to wait for a decision of His Majesty's Judges on the subject.

Turning to the work of the department for the period under review, it may be mentioned that the number of applications for patents shows a very slight falling off as compared with the previous year (the figures being 28,832 and 28,972 respectively), but a substantial drop from the high-water mark of 1897, when the number was close upon 31,000. A glance at the income and expenditure accounts will reveal the profitable character of the work carried on by the Patent Office. In 1903, the receipts from patents fees amounted to £223,504, from designs fees to £4097, and from trade mark fees to £12,320; while £9002 was realized by the sale of publications. The total receipts were thus £248,924, which compares with £242,285 in the previous year. The total expenditure, however, was £124,055, against £114,925: showing a greater proportionate increase—mainly, of course, due to the preparations for carrying out the provisions of the new Act. But in spite of this additional outlay, it will be seen that the surplus of receipts over payments was no less than £124,869. The reconstruction of the Patent Office was completed during the year; and the total cost of the new buildings, including the acquisition of the site, and about £8000 on account of furniture, is estimated at £167,750. By way of contrast, the report mentions that a new Patent Office is about to be built in Berlin at an estimated cost of £700,000.

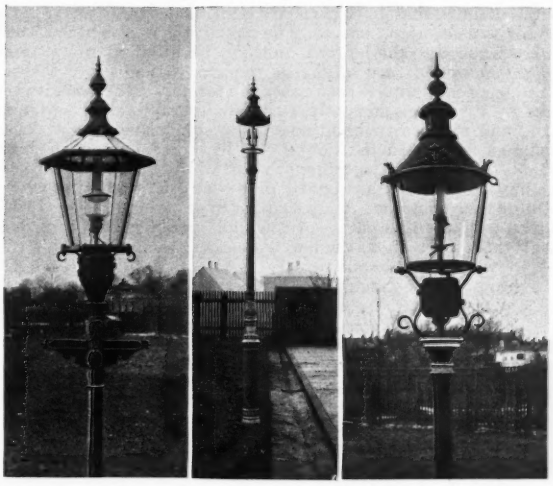
The report is accompanied by some appendices which contain interesting figures with regard to the applications and patents. For instance, it appears that the number of applications received since Jan. 1, 1884, has reached the enormous total of 475,571. After England and Wales, the United States and Germany have contributed by far the largest share of these; while Scotland comes third, and France fourth. The total number of patents granted in 1903 was 15,718—the largest number ever sealed in any one year. Of these, 7776 were to persons residing in the United Kingdom. The proportion of patents granted to foreigners in the four years 1900-1903 was 48·7, 50·3, 47·3, and 47·4 per cent. respectively. Patents were sealed upon 15,191, or 52·4 per cent., of the applications made in 1902; while 451, or 4·3 per cent., of the patents sealed upon applications made in the year 1890 were maintained for the full period of fourteen years. From this it would seem that in the vast majority of cases the taking out of a patent is less profitable to the inventor than it is to the Patent Office.

The allocation of the specifications to the different classes arranged by the office, shows that there has been a gradual development of invention over a wide field, rather than a rapid growth in a few classes. Among those classes which were at a maximum in 1901 and advanced still further in the following year, were air and gas engines and several electrical branches—the most striking advance, of course, being exhibited by the latter. On the other hand, there was a noteworthy falling off in applications appertaining to penny-in-the-slot machines and drying and heating systems. The patents relating to air and gas engines increased from 310 in 1901 to 346 in 1902, those referring to gas distribution from 41 to 55, and those in connection with lamps, &c., from 353 to 399. Inventions concerning gas manufacture, however, showed a decrease from 140 to 129, and those appertaining to heating, from 280 to 257. Referring to the trend of invention in 1903, the report states that the subject of electric traction received much less attention than in the two or three preceding years. Once more the Comptroller is ungallant enough to draw attention to the insignificant part played by the weaker sex in the field of invention, by pointing out that the number of applications received from women in 1903 was only 583, or 2 per cent. of the total number; while of these about 194 were for inventions connected with articles of dress, and 112 had reference to cooking and domestic economy.

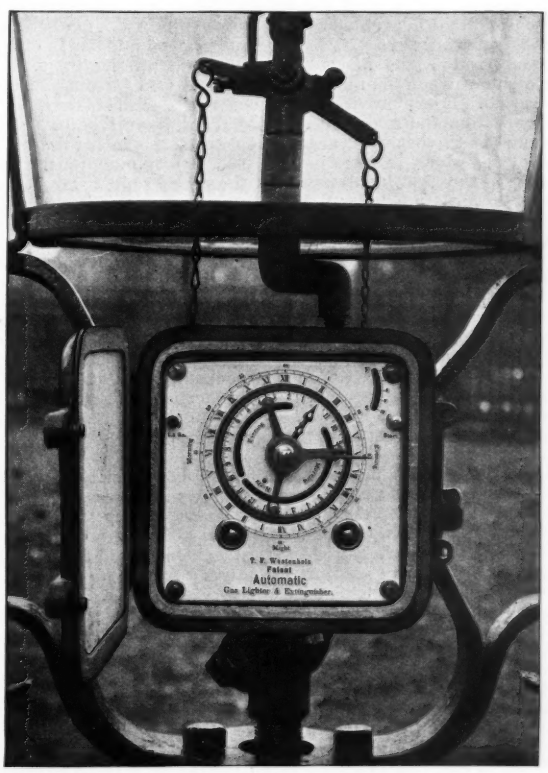
Visit of Members of the Institution of Civil Engineers to America.—In response to invitations from the American Society of Civil Engineers and the Canadian Society of Civil Engineers, a party of members of the Institution of Civil Engineers are intending to visit those bodies in New York and Montreal respectively in September; and, after these engagements have been fulfilled, many of the visiting party will go to St. Louis to see the Exhibition. Among the members who have *provisionally* signified an intention of taking part in the visit, we notice the names (in alphabetical order) of Mr. C. E. Botley, Mr. George F. Deacon, Sir Fortescue Flannery, M.P., Mr. Charles Hawksley, Mr. Charles Hunt, Mr. H. E. Jones, Mr. R. E. Middleton, Mr. Joseph Parry, Mr. G. C. Trewby, Professor Unwin, and Mr. Corbet Woodall. Among the associate members are observed the names of Mr. C. E. Brackenbury, Mr. Samuel Cutler, Mr. Maurice Graham, and Mr. G. F. Zimmer. Among the students is Mr. Arthur Trewby, B.A. The date of departure has been fixed for Sept. 3, from Liverpool.

WESTENHOLZ'S PATENT AUTOMATIC GAS LIGHTER AND EXTINGUISHER.

Among the several ways in which during recent times invention has been brought to bear in effecting working economies, has been the automatic lighting and extinguishing of gas-lamps, both in public places and large establishments; and the production of devices of various kinds, and of a more or less dependable



character, has been the result. By them—or rather by those that are proved to be reliable—economy is realized first through the saving of a large proportion of the labour employed in making a double visit to each lamp daily for the purpose of lighting and extinguishing; secondly, through the saving in the consumption of gas by the simultaneous lighting and extinguishing of the lamps; and thirdly, through the protection of mantles against violent harm from torch and explosion caused by the sudden ignition of the full flow of gas when the torch is used.



Against these savings, something must be set for repairs; but, according to figures supplied in connection with the newest introduction, it is seen that the balance of saving is enormous.

This latest introduction is from Denmark; and as the new arrangement was, before he left Copenhagen, under the personal observation of Mr. F. D. Marshall, who speaks very highly of its reliability, we have no hesitation in placing it, and an account of

its merits, before our readers. Briefly, the new apparatus is intended to supplant the lamplighter; and it does its work in precisely the same way by raising and lowering (for lighting or extinguishing) the lever of the cock by arms or chains connecting the mechanism with the lever. The operating mechanism is of a very compact form, is contained in an air-tight case, and is quite independent of the gas supply—the service-pipe being carried in a groove provided on the exterior of the back of the case to the burner or burners in the lantern above. In fact, there is nothing coming from the interior mechanism to the outside of the casing excepting an axle carried through a stuffing-box constructed in such a manner that it is perfectly tight, and cannot serve as a way for any injurious effect. The apparatus is placed between the lamp-post and the lantern, and can be fitted on any modern or old-fashioned lamp; all that is required being a bye-pass jet or an electrical igniter—preferably the former. The contrivance is not by any means unsightly, as the photographs of street-lamps of old and modern types fitted with it conclusively show. The appliance is constructed not only to light and extinguish single and cluster lights, but to extinguish part of the number of burners forming a cluster at any given time—leaving one or more on until the time comes for the remainder to be extinguished. It will be seen from the illustration of the appliance (with the case door open) that there is a double dial—the inner dial being the one to which the hands are set which determine the hours of lighting and extinguishing. They work in the slots in the dial, and are moved by simply lifting them out of the teeth in the dial. The hands were not specially arranged for illustration, but they will answer the purpose. The lighting hand for a whole cluster is set at 3.30 in the afternoon; the second hand, for the extinguishing of part of the burners, is set for 1.30 a.m.; and the third hand, for the extinguishing of the remaining burners, is set for 8.30 a.m. When the hands of the clock (working round the outer dial) synchronize with the hands on the inner dial, then the lighting and extinguishing as described take place. The mechanism is so accurately constructed that it must—and Mr. Marshall states that his experience proves that it is so—fulfil these actions within a few seconds of the time to which it is set. There is an advantage in that the burner cock can at all times be operated apart from the automatic device in the case of emergency—such as a fog or fire.

It is unnecessary to go minutely into the details of construction. Suffice it to say that we are perfectly satisfied as to the high-class workmanship which has been put into the instrument in every part. It is very strongly made as the tests applied prove. For instance, the axle protruding from the stuffing-box to which reference has been made is so powerful that one cannot, when it is in action, stop it with the fingers alone; and therefore it is impossible that a cock can resist being turned, even when, for some temporary reason, it has become clogged and works stiffly. The apparatus only needs adjustment and winding up once a fortnight, or when the times of lighting and extinguishing have to be varied. Every provision has been made—and successfully it appears from the information afforded by many months' use in Denmark—to ensure accuracy, even down to the regulating of the clock, which is performed by the little pinion in the slot shown in the right-hand corner of the photograph being moved either towards "F" (fast) or "S" (slow). It has been shown that the mechanism cannot be affected by moisture, air, gas, or dust; and the severe changes of weather in Denmark have, through the preventive means adopted, had no effect whatever upon the apparatus. The case, it is noticed, is lined throughout with asbestos—5 millimetres thick—which prevents condensation on the inner surfaces through changes of the temperature, and obviates any injurious effect from sun or frost. If anything should get out of order, the mechanism is merely slipped out of the case (which by the way is kept locked), and another interior put in its place—no unscrewing or displacement of any kind being required. In fact, a renewal can be made in a few minutes. But renewals, judging from the samples inspected, should be few and far between.

Now a few words in extension of the advantages. In the first place, by the use of the apparatus, it is possible for a lamplighter to look after double the number of lamps, and, in some places, even three times the number, seeing that he has only to clean the lanterns, and fortnightly wind up the mechanism, and, if necessary, regulate the clock or readjust the hands. A man on a bicycle is able to inspect a whole district in a very short time, as all he has to do is to look down each road, and see that the right number of lamps are alight; and only in cases where a deficiency was shown, would he have to go down the road to ascertain the cause and remedy it. Then, again, it has been found, by experience, that there is a great saving in mantles where these automatic arrangements have been introduced; the action being so steady and gentle that, as previously explained, the lighting and extinguishing are not responsible for shocks. There is also great saving in gas. In cases where all the lamps have to be lighted and extinguished by certain hours, the lighting or extinguishing has to be commenced some considerable time beforehand; but, with the automatic device, it is possible to light and extinguish the lamps of a whole town almost simultaneously—at any rate within (say) a couple of minutes. A number of these appliances have been working for two years in Denmark—among other places on the road outside Mr. Marshall's residence in Copenhagen; and this gentleman speaks highly of their unfailing promptness in action. An authoritative record of trials covering several months has been shown to us; and from it it is seen that the average variation in action did not exceed nine seconds per day.

Now as to the pecuniary side of the savings. A calculation has been made having for its basis a district in one town in Denmark, with 753 lamps. The lamplighters' wages for that area amount to 18,497 kroners, which sum (taking 18 kroners to the pound) is equal to more than £1000 per annum. With the automatic appliance in use, all the charges—including wages, repairs, and amortization—only amount to 11,752 kroners. The total saving in gas and mantles is estimated at 3865 kroners, which leaves the net cost of lighting and extinguishing, as compared with the old arrangement, at 7887 kroners. The difference between the 7887 and the 18,497 kroners represents a saving of £583, which is about 15s. 6d. per lamp on the 753 lamps, clear of all charges. These figures speak for themselves; and as to the character of the appliance in point of construction, that is a matter about which it is a pleasure to say a good independent word.

[Arrangements have been entered into with Messrs. Falk, Stadelmann, and Co., Limited, of Farringdon Road, E.C., for the introduction and sale of the apparatus in this country and the colonies. The instruments are fitted up, and can be seen at work at their show-rooms.]

PERSONAL.

At the Trinity examinations held by the Council of Legal Education, Mr. C. E. Brackenbury, Assoc.M.Inst.C.E., of the Continental Union Gas Company, passed in "Roman Law." Mr. Brackenbury was entered from the Middle Temple.

We regret to learn that, after a long and serious illness, Mr. Charles Wright has retired from the position of Manager of the Saffron Walden Gas-Works. His service, first with the Company and later with the Urban District Council, has extended over the long period of upwards of 48 years; and he has therefore well earned the release from active duties which we trust he may long live to enjoy. He is succeeded in the management of the works by his son Mr. T. G. Wright.

In consequence of impaired health, Mr. T. Douglas Hall has resigned the position of Manager of the Montrose Gas Company, which he has held for about nineteen years. This step will remove from the ranks of the active workers in the gas profession, at all events for a time, one who has laboured well to uphold its interests. Thirty years ago, Mr. Hall went to Redruth—the cradle of gas lighting—where he had the unique experience of unearthing some of Murdoch's original brick tanks, as well as of reading and watering the meter in his old house in Cross Street. In 1878 he crossed the seas to Australia, but returned to England after a few years. He went to Montrose in 1885, and soon set about improving the gas-works there. The extensions were completed by the autumn of 1891; and the Works Committee expressed themselves highly pleased with all that had been done. Mr. Hall then received an increase of £20 per annum in his salary, in consideration of his careful management. The year following his appointment at Montrose, he was admitted a member of the North British Association of Gas Managers; and in 1899, at the meeting at Dunfermline, he read a paper on "The Cessation of Work on Sundays." He was President in 1893, and Chairman of the Informal Meeting of Scottish Gas Managers in 1892.

This year is the Diamond Jubilee of the York United Gas Company; and it also marks a period of fifty years' service of the Manager and Secretary, Mr. Matthew Leaf. In recognition of the latter event, the Directors last Thursday presented to Mr. Leaf a handsome silver salver, with an appropriate inscription. The Chairman of the Company (Mr. J. R. Hill) was unavoidably absent; but his place was taken by Mr. J. Melrose (the Vice-Chairman), who made the presentation. In doing so, he said the Directors had not failed to observe the intelligent application of Mr. Leaf's efforts in promoting the welfare and prosperity of the Company, and they fully appreciated his persevering endeavours to achieve the best possible results, as well for the benefit of the shareholders as for the public at large. As the result of scientific research, the manufacture and adaptation of gas had been greatly improved; and its application, whether as an illuminant, as motive power, or for domestic purposes, largely extended. To the introduction of such improved conditions Mr. Leaf had not failed to give careful thought, coupled with a willingness to incorporate what had since proved to be of such great utility. They trusted that, with the blessing of good health, he might be long spared to discharge the duties of the position he so worthily occupied, and that the memento of the Directors' appreciation of his able services which he asked him to accept might be handed down to his family for generations to come. The salver—a massive piece of silver plate, beautifully finished and chased—bore the following inscription: "Presented to Mr. Matthew Leaf, Secretary and Manager of the York United Gaslight Company, by the Directors, in recognition of 50 years' faithful service to the Company, June 2nd, 1904." Mr. Leaf, on whom the presentation came as a complete surprise, expressed his gratitude to the Directors for their gift, which he said he would prize very highly. He referred to the past history of the Company, and expressed the view that the outlook for gas was brighter now than it had been since electricity appeared in the field as an illuminant.

THE CONVERSION OF COKE DUST AND BREEZE INTO LARGE COKE.

By W. R. Herring, of Edinburgh.

Some six weeks ago, I had occasion to visit a gas-works near Paris, and was then informed that they were experiencing some little trouble with the slipping of the coal in the retorts of a new inclined retort installation recently put to work—the particular class of coal used being French.

To overcome the difficulty, they at first experimented by mixing the small proportion of cannel used with the bulk of the coal. This not proving satisfactory, 5 per cent of coke dust and breeze was intermixed with the coal, and found to overcome the difficulty entirely.

I am not at the moment concerned with the question of the slipping of the charge in the retorts, although this has been made much of by the opponents of inclined retorts. I have admitted that a coal having the characteristics of broken pitch would, when charged upon the sloping bed of an inclined retort, liquefy and run to the bottom; and if there is any natural coal approaching this physical characteristic, then it would doubtless behave in the same manner. Those, however, who suffer from slipping charges can easily experiment on their own account. It has been my good fortune never to experience it, although I have used some of the very coals that have been specially mentioned as possessing this peculiarity when charged into an inclined retort.

The idea, however, of mixing coke dust with the charge of coal going into a retort occurred to me to be a first-class means of converting low-priced residuals to one of comparatively high value; and immediately upon returning home I carried out a series of experiments with the low-grade caking coals such as we handle in Scotland. I found that 5 per cent. could be intermixed with most of the common coal without in any way impairing the quality of the resulting coke; and experimenting with what we call a strong caking coal—a coal that can be compared equally with the Newcastle and Durham coals—I found that 15 per cent. of breeze in no way impaired the quality of the coke. With such a large percentage, however, it is important that the dust be most thoroughly intermixed with the coal.

There is yet another point which I am further investigating at the moment. The intermixture of coke dust in the caking coal appears to facilitate the expulsion of the gas from the mass, and thus enables a heavier charge to be worked off in the same period of time.

As caking coal and coke dust and breeze are to be found on most English gas-works, it would be highly interesting if a number of experiments were made by different men. The most intimate mixing, however, is of the highest importance; and where any mechanical appliances are used for the handling of the coal, means should be devised for carefully proportioning the dust and the coal passing to the elevators.

For experimental purposes, this can be performed by hand; but to avoid the expense, and ensure something like definite percentages for permanent operations, a hopper conveniently situated (into which the coke dust and breeze could be elevated) should be installed, while the discharge of the breeze should be mechanically controlled in proportion to the feed of coal to the elevators, so as to ensure the most perfect intermixture of the two substances.

One sees visions of the item of breeze entirely disappearing from the tabulated statements of English gas-works statistics—an item which in the 1902 issue of "Field's Analysis" amounted to no less than 37,479 tons for the three Metropolitan Gas Companies alone.

A PRACTICAL TEST OF GAS AND ELECTRICITY AS SOURCES OF MOTIVE POWER.

By Thomas Canning, Assoc.M.Inst.C.E., of Newport.

By the favour of Messrs. J. Linton and Co., Limited, Builders and Contractors, of Newport, I was permitted recently to make a comparison between work and the cost of the same performed by a gas-engine and an electric motor respectively. The gas-engine in this case is a Crossley of 6 nominal horse power, fixed on May 28, 1898. It works to a maximum of 16, and to a safe constant working load of 13·5 brake horse power. There was no special preparation for the test, no repairs were executed, and no alteration was made from the ordinary every-day working of the engine. It is also only fair to the makers to say that the engine has never been repaired since it was fixed, with the exception of the replacing of the ignition tube. The electric motor is of the Byng-Hawkins type, made by the General Electric Company, Limited. It is marked 14-horse power, 260 volts, 1000 revolutions. The motor is a new one, whereas the gas-engine has been in constant work ever since 1898. An admirable opportunity was given in this case for testing with exactitude the practical working of these motors, both gas and electric, because the contractors had placed upon each two identical sets of machinery made by the same maker, and guaranteed to turn out the same amount of work. The machines upon each were a planing-machine, to plane timber 18 in. by 6 in., and a circular moulding-machine to work up to 6 inches in depth. These machines were fully employed during the test in planing and moulding pine. I was aided in the test by my Assistant and Inspector with the extra help, of course, kindly given by Messrs. Linton and Co. for the starting of the motors, &c.

First, both motors were stopped working, and the meters connected to each carefully read and duly recorded. The next step was to start the motors to work the machines above indicated for one hour, at the expiration of which they were again stopped, and the meters read and recorded as at the commencement of the test. From the start, the balance was in favour of the electric motor rather than the gas-engine, because the latter had 35 feet of countershafting on six bearings, while the electric motor had only 16 feet on three bearings. Both motors, however, performed their work admirably, and when the time-limit of one hour was reached, the recorded readings were as follows:—

Consumption of gas	110 cubic feet.
Electricity	4 38 units.

An indicator diagram was taken of the gas-engine; also the number of revolutions and explosions per minute were registered. These showed that it gave an energy of 6·2 brake horse power; being less than half its safe working load. A similar remark must apply to the electric motor, as it is quite evident that the absorption of 4·38 units did not represent more than half the power of that motor, allowing to it the maximum efficiency claimed by electricians, but, as is well known, seldom reached. However, my function is not to theorize, but to state exactly what was observed. The cost of 110 cubic feet of gas at 2s. 10d. per 1000 cubic feet used during this experiment in the gas-engine was 3·74d. I could not ascertain what charge was made per unit for electricity, because, as I was given to understand, it was made upon the maximum demand system, and varied according to the load and number of hours worked. But the lowest charge I understood at any time would be at the rate of 1d. per unit. Taking electricity, therefore, at this figure, and comparing it with gas at 2s. 10d. per 1000 cubic feet, the result is quite clear that gas is by far the cheaper—viz., 3·74d. per hour, against 4·38d. for electric energy. In this engine, working under the conditions described, and not being a new engine, the consumption of gas was 25 cubic feet = 1 unit of electricity. In a new engine of the latest type, the gas consumed would have been much less. The calorific value of the gas at Newport, as tested by the Simmance and Abady calorimeter, averages closely 650 B.T.U.; and I attach much of the success of the trial in favour of the gas-engine to the comparatively high calorific power of this gas.

As at Newport gas is sold at varying prices—from 2s. 6d. for power purposes—it may be useful here to make a comparison between the cost of gas and electricity at different rates. The following table is calculated on the basis of 25 cubic feet of gas = 1 unit of electric energy, which, as has been shown, is altogether too favourable to electricity; but it proves all the more conclusively that an electric motor has no real chance in competition with a modern gas-engine, especially when working under full load.

Price of Gas per 1000 Cubic Feet.	Costs, at Various Prices, per Unit of Electrical Energy Capable of Performing the Work done by One Pennyworth of Gas.					
	1d.	2d.	3d.	4d.	5d.	6d.
s. d.	d.	d.	d.	d.	d.	d.
3 0	1·112	2·224	3·336	4·448	5·560	6·672
2 10	1·176	2·352	3·528	4·704	5·880	7·056
2 8	1·250	2·500	3·750	5·000	6·250	7·500
2 6	1·333	2·666	3·999	5·332	6·665	7·998
2 4	1·428	2 856	4·284	5·712	7·140	8·568
2 2	1·538	3·076	4·614	6·152	7·690	9·228

Even on the ample basis of 25 cubic feet of gas being equal to 1 unit of electricity, it will be seen from the above table that a consumer will pay 1·112d. for as much electrical energy as would do the work obtainable from a pennyworth of gas when gas is 3s. per 1000 cubic feet and electricity only 1d. per unit; and so, in like manner, when gas is 2s. 6d. per 1000 cubic feet and electricity 2d. per unit, a consumer will pay 2·666d. for as much electric energy as will do the work obtainable from a pennyworth of gas. The reader can easily follow the table, and make what further comparisons he may wish for.

In conclusion, I should like to draw attention to the calorific value of the gas, which it will be noticed was high. In view of the quantity of gas that is now used for cooking, heating, and motive power, it will be superfluous, I think, to insist upon the necessity of gas engineers maintaining the high calorific power of what is commonly known as town gas, which has a field of its own; and in that field no known source of energy can take its place, so long as its present high quality is conserved.

Dutch Association of Gas Managers.—We are pleased to learn that Mr. Jacques Abady has been engaged by the Council of the Dutch Association of Gas Managers to read a paper entitled "Light Measurement" at the meeting which is to be held next month at Maastricht. The paper is to be accompanied by actual demonstration of modern photometry, for which special arrangements are being made.

THE MIDLAND ASSOCIATION AT NUNEATON.

About the annual visits of the members of District Associations to the towns in which their Presidents hold the reins of gas management under the authority of Board or Committee, there is always the charm of freedom; and the members delight to indulge in it to the utmost degree. Nothing is rigid and formal. Hearty is the welcome and the hospitality, and hosts and guests mix as men having one common object. The visitors are allowed to run as they will over the gas possessions of the Company or Corporation; and the owners are happy that it should be so. Works exhausted, the sights of the neighbourhood are shown; and altogether the spirit of *bonhomie* is present the day through. And so it was, in all respects, on Thursday last when the members of the Midland Association of Gas Managers assembled in large numbers in Nuneaton, where their President (Mr. George Helps) has now been exercising for some years, with great activity and success, his talents in the interests of the Gas Company.

The Welcome.

It was in the Assembly Room of the Conservative Club that the members foregathered at the early hour of eleven; and, forsooth, it was necessary that they should take the journey in good time in the morning, for the President had made such arrangements in the way of a programme (which foreshadowed unusual interest in every item) that several hours were needed for faithfully going through it. The President ascended the platform soon after eleven o'clock; and with him were the Chairman of the Company (Mr. T. P. Iliffe), the Vice-Chairman (Mr. R. W. Swinnerton, J.P.), and two other Directors—Mr. Charles Parsons and Mr. George Liggins. Later in the day, the fifth Director (Mr. R. Wilson) joined in the proceedings. Among the visitors was Mr. H. E. Jones, the President of the Institution of Gas Engineers. Sir George Livesey had accepted an invitation. But unfortunately he missed the railway connection, and therefore could not arrive in time to share in the day's proceedings.

Mr. Iliffe at once addressed the visitors. He remarked that the position he occupied at that moment was unique in the history of the Nuneaton Gas Company. The present Directors had for many years been associated with the gas industry in the town; and they had never stood still. Very quietly and very cautiously they had been thinking and doing; but they had never once contemplated such an honour as the Association, by the presence of the members that day, had conferred upon them. He could assure them, on behalf of the Directors, that it was with very great pride and pleasure that they were able to welcome the members. When the question of an invitation first arose, naturally the Directors were very modest and innocent, and wondered what attractions or inducements there could be to bring the members to Nuneaton. The queries resolved themselves into three main questions. Was it to do honour to whom honour was due—to pay a compliment to their worthy President? Was it to learn something? If so, the Directors hoped the members would gain some information by coming to Nuneaton. Or was it that the members would like a day's outing through the George Eliot country? If the members would allow him to say so, he thought all these three factors should be combined. The members had come there to do honour to their President, to learn something, and to enjoy themselves. He hoped this would be the result. He also expressed the wish that the members would not go to the works with their pupils dilated, and expect to see such works in point of magnitude as some of them controlled. They were very modest gas-works; but the Board had done whatever they possibly could, consistent with demands, to make the works efficient. The Directors asked the members to criticize freely, and to tell them if there was anything wrong about the works. He and his colleagues knew what defects there were; and they had an explanation for those defects. But they were open to criticism; and they hoped their visitors would not spare them, because, in doing so, the Directors were likely to learn something.

In acknowledging, on behalf of the Association, the kind words of the Chairman, the President said he knew before the day had passed that every member of the Association—nay, later, every member connected with the gas industry—would feel that he personally was under a deep debt of gratitude to the Directors of the Company. He believed that, when the members had been round the gas-works—small as they were and modest—they would agree that the Directors had not been behindhand. They had not waited for others to lead in every direction, so that they might follow. As the Chairman had pointed out, there was a lot for the management of the Company to learn; and it was to be hoped that they would be gainers by the day's proceedings—by listening to the candid criticisms of those points which attracted attention. The Company were honoured that day by the presence of men in the very front rank of the gas industry; and he attributed this honour to nothing else than the work of progress which had been instituted in the town. He thanked the Chairman and Directors very heartily for the kind manner in which they had invited and welcomed the members to Nuneaton.

New Members.

The next item to engage attention were the minutes of the meeting held on Feb. 25 last. They were read by the Honorary Secretary (Mr. A. Cooke), and were immediately confirmed. Mr. Cooke then produced the new nominations for membership. There were only two candidates—Mr. James Camm, of Quorn, near Loughborough, and Mr. H. G. Ruggles, of Irthlingborough. The resolution which constituted them members was moved by Mr. Thos. Berridge, of Leamington, and seconded by Mr. W. C. Jones, of Brierley Hill.

Agreement with Affiliation.

The question of affiliation was then introduced by Mr. Charles Meiklejohn, of Rugby. He observed that he thought it was scarcely necessary that he should occupy time by even a few remarks on the subject. It would be remembered that the matter was discussed at the February meeting; and the lines which the Association recommended as those upon which they would be agreeable to affiliate had since been considered by the Special Committee appointed by the Council of the Institution from their own members and representatives of the different District Associations. The Committee had recommended the lines on which affiliation should take place; and the Council of the Institution had accepted their proposals. As the recommendations were practically identical with those proposed at the last meeting, and almost unanimously accepted, he (Mr. Meiklejohn) thought it was unnecessary for him to say another word. The four resolutions or rules governing affiliation had been sent to each member of the Association; and he would therefore content himself by moving that the members agree to affiliation on the terms proposed by the Joint Committee, and endorsed by the Council.

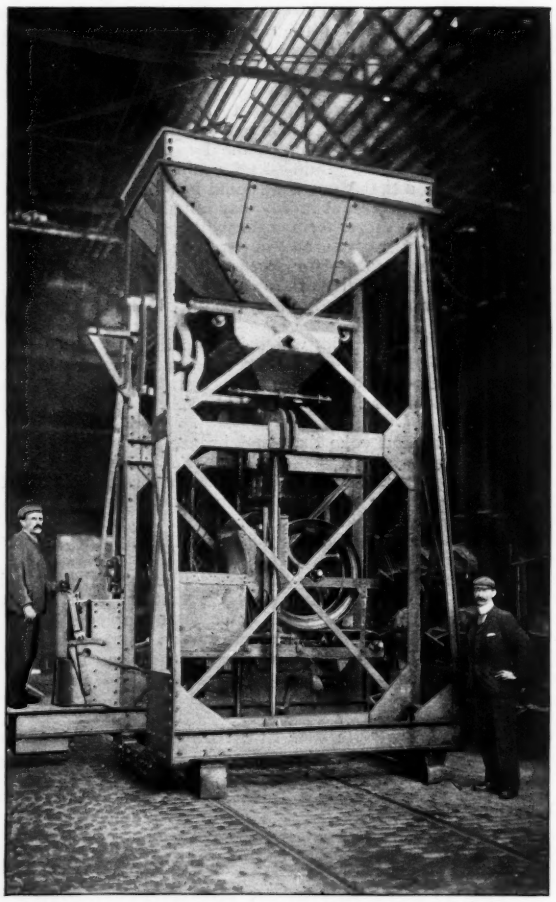


Fig. 1—The De Brouwer Charging-Machine.

The motion was seconded by Mr. T. Berridge, and, without discussion, was unanimously carried.

Before leaving the room, the President suggested that those members who could conveniently remain until lighting-up time should do so, and inspect the lighting of the Stockingford Station of the Midland Railway. Mr. H. Fowler would be very pleased to see the members there. The station was lighted by about 400 burners, supplied from the high-pressure gas-main.

At the Gas-Works.

A short walk from the Conservative Club brought the members to the gas-works, which, if not large, bear considerable witness to the inventive genius of Mr. George Helps, about much of

whose work, in various ways, readers have had opportunities of learning something, especially through our "Register of Patents." But it is not upon the man, but upon his work, that we have to dwell here; and in bringing to notice the special features of the Nuneaton Gas-Works in this account of Thursday's visit, it will be recognized without repetition that the skill that has produced them is that of the Engineer and Manager.

It was to the retort-house that the visitors first turned; and there they found a bench of ten arches, all but one of which contained settings of six retorts. These, excepting one or two set on the President's own methods, are of the Winstanley type; and the heats were found to be excellent. First of all, the visitors' eyes alighted on a De Brouwer charging-machine (Fig. 1), which is a new installation, but is doing very good work indeed in the hands of the men, although its manipulation is entirely fresh to them. The machine is one of the type that is mounted on a carriage, running on a ground track, and carrying above on the framework a hopper for feeding the projector. The charger is capable, it was learnt, of dealing with about 5 tons of coal per hour; while the coal breaking and elevating machinery can deal with from 10 to 15 tons an hour. The overhead storage hopper has a capacity of about 8 tons, and the charging-machine hopper a capacity of about 2½ tons. The machine is propelled by a 7 brake horse power motor; and the projector is raised and lowered by the same motor. Another motor of 3 brake horse power operates the projector. A 20-horse power "National" gas-engine drives the coal and elevating machinery, as well as a dynamo of 12-horse power, which supply the two motors on the charging-machine (fig. 2). The charges, it was mentioned, are 4 cwt. ones, every six hours. As the machine had only been at work two or three days before the visit, the men had not quite found the best speed, and the make of gas per ton had, in consequence, slightly diminished for the time being. However, Mr. Helps gave expression to his opinion that he had not any fear as to the ultimate success of the machine; and most of those present—there were a few critics who thought the

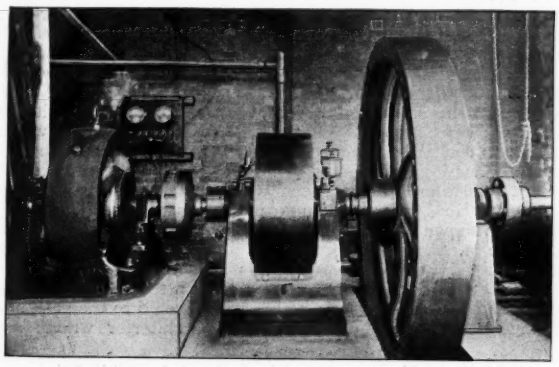


Fig. 2—The 20-Horse Power Gas-Engine and Dynamo for Driving the Projector and Coal Plant.

charges were not so level as they obtained under their own different practice—fully agreed with him, as experience in operation will bring improvement. The charging of a row of eight retorts was watched; and it was expeditiously performed. The retorts are only 10 feet in length by 26 in. by 16 in., and are about two-and-a-half years old. From the second that the lever was lifted releasing the coal from the machine hopper, to the end of the charge of each retort, the time occupied was only represented by about 4 or 5 seconds. Including the moving of the machine from retort to retort, the eight were charged in something less than 4 minutes, and by unskilled hands.

Attention was next directed to the special arrangement of hydraulic main invented and patented by the President (figs. 3 and 4), to which he attributes great things, and from the use of which he expects even greater things in the future. It is apparent that the Company when Mr. Helps became their Engineer did not set out with the intention of being behindhand in gas manufacture, particularly so far as the make of gas per ton of coal is concerned. For the past two months, since the Company have had this new hydraulic main arrangement in use, they have averaged a make of 12,000 cubic feet of gas per ton of North Staffordshire or any other coal that they may for the time have been using. This is about 14½-candle gas; and it is enriched, by a carburettor, to the extent of ½ or ¾ candle. Mr. Helps very cordially invited any gentleman who thought this statement a little far-fetched to spend a week—night and day—on the works and test the results for himself. There was not a rush of members desirous of availing themselves of the invitation; so that it must be taken that there was nobody present audacious enough to question the accuracy of the President's assertions. Mr. Helps produced a drawing of this main and of the patented arrangement; and from this drawing we give an illustration (fig. 3). It is a combined dry and wet main, in which the seal may be entirely dispensed with between charges, or regulated to give just the seal desired, and by the use of which all valves on the ascension and bridge pipes are done away with. It is claimed that no dry main can give the results this main is producing. "Valves on bridge-pipes," says the President, "require cleaning, and are never sound. The advantage of a tenth of an inch seal during charging time, which seal is removed afterwards, must be obvious. No thick tar can accumulate by this arrangement. People who have been shy of dry mains may now have the combination—dry and wet." According to the information given by Mr. Helps to his inquiring friends (of course, this information must not be taken in the light of a carefully prepared description), there is a displacing chamber inside the main, to which either gas or air under pressure can be connected up. At Nuneaton, it is connected up to the outlet of the purifiers. On the connection there is a three-way valve, which is at will connected with the displacing chamber and with the high-pressure gas. On this valve, there is an ordinary wheel, over which passes a pair of chains with counterbalance weights. These were seen depending from the wall of the house facing the bench. Each bed has a separate hydraulic main; and therefore on the wall in front of each bed is hanging a pair of chains. However, by simply pulling one of the chains, the pressure is brought to bear in the displacing chamber; and this displaces sufficient water to act on the outside of the chamber, so as to seal the whole of the pipes on the bed. The seal can be regulated. All that is required is a $\frac{1}{10}$ inch seal, or just sufficient to stop the gas coming back. At the time of the visit, a ¾-inch seal was being used. During the charging of the retorts the pull is

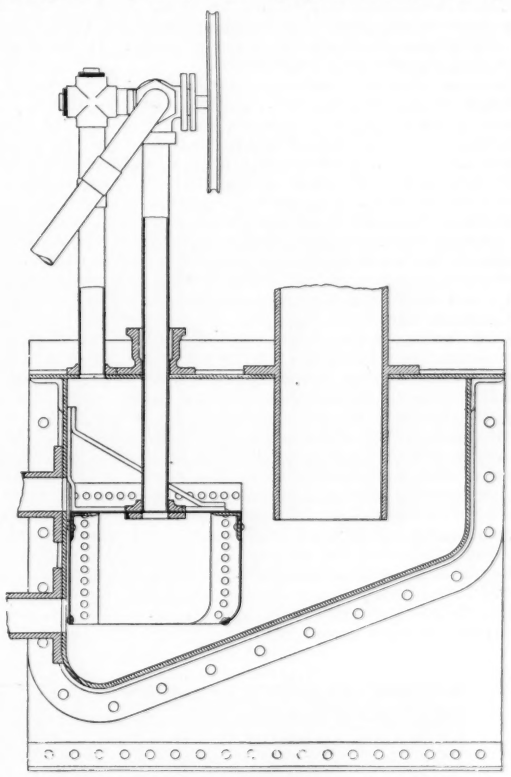


Fig. 3—Section of Hydraulic Main and Displacing Chamber Arrangement.

arranged so that there is just about $\frac{1}{10}$ inch to be overcome by the gas on its way to the foul main. As soon as charging is ended, all that has to be done is to pull the other chain down, and a free way is again secured; the action being quite instantaneous. Now when this arrangement was first tried, it made (says Mr. Helps) a difference in the upward direction of 800 cubic feet of gas to the ton; and since then he reckons the difference is nearer 1000 cubic feet per ton. Formerly the usual make was about 11,000 cubic feet per ton; now it is at least 12,000 cubic feet, with practically the same coal. The cost of making the alterations to the hydraulic main was only £70; and the saving on coal and wages is estimated at £700 a year. There was unanimity among the members in describing the arrangement as a very simple one. "It is," observed Mr. Helps, "a patented arrangement; and, as I am a very poor fighting man, infringers will have a very easy and happy time of it." This was said in manner and tone which appeared to be somewhat ironical; so that those who heard and those who read must not take what was said as literally correct.

Then there was another little interesting feature to which attention was drawn. Mr. Helps has an arrangement for scurfing retorts (which, by the way, is not patented); and by its use, he assured his visitors, the retorts are easily and absolutely freed from carbon. The retorts are continued through the back wall; and a small hole is left there, which is plugged up with brick

ends. When a retort requires scurfing, the plug is taken out, and air is let in; and the retort is scurfed in a couple of hours.

Looking into an adjoining building, the members saw the 20-horse power "National" gas-engine, and the 12-horse power dynamo, respectively driving the coal breaking and elevating machinery and supplying the two motors for the De Brouwer projector. And then in a chamber under ground, the President showed the members a new meter, for which the Nuneaton Gas Company have secured the sole agency for Great Britain and Ireland. This is a new departure for a Gas Company. The meter is a little thing; and it was regretted that particulars as to it are not available at the present time, for reasons which the President said nothing about. Standing by the meter, Mr. Helps was plied with numerous questions respecting its construction. It seems that he has been dealing with it for more than eighteen months, has tested it in all ways that he can think of, and he spoke of it as "the best meter for many present-day requirements that is on the market, or is likely to be there." Comparing it with a 50-light dry meter, he advanced the following: A 50-light dry meter costs £4 15s., and is capable of passing 5 cubic feet to 600 cubic feet under certain low pressures. The bulk of such a meter is above 10 cubic feet, and the highest pressure with which it can be conveniently used is 6 inches. The new meter will cost about £2 10s., and has a capacity of from 50 to 400 cubic feet. It occupies about 1 cubic foot of space, and can be used for 1 inch or 25 lbs. pressure. The meter has not yet been stamped by the Government inspectors; but (asserted Mr. Helps) it will be. His experience is that it is an absolute measure. Next to this meter in the same underground chamber was pointed out a single valve, with diaphragm, for diminishing the pressure. It has a lever action, and was very highly spoken of.

It is known that the Nuneaton Gas Company have gone in for the supply of high-pressure gas. A section of 3-inch steel high-pressure main was shown, to which a meter and other fittings were connected. The holder was inspected, as well as the gas-compressors (fig. 5). As the Company are at present working, it is only necessary to go up to 25 lbs. pressure in the holder, and to lower this by a reducing-valve (the same as is used for steam purposes) on the outlet to 5 lbs. This is ample for the number of high-pressure consumers the Company have at present. As the consumption increases, of course, the pressure can be increased. Mr. Helps stated that they had tried experiments with 30 lbs. pressure "on;" and he should have no hesitation in putting on 25 lbs. The Company have been supplying high-pressure gas in a district for about twelve months; but the system has been installed at the works about fifteen months. Apart from the advantages of high-pressure gas for special lighting purposes, the President pointed out that his experience was that a high-pressure main only cost about one-third that of a low-pressure main, supplying the same quantity of gas. On the section of high-pressure main under observation was seen a tapping-machine adapted for making connections. Among other novelties in this connection was a patented high-pressure street-lamp, fitted with a telescopic arrangement for protecting burner and mantle during cleaning. This lamp is of the form known as the "arc;" and, when cleaning is required, the man simply slides out the new fitting containing the burner and mantle; and the act of withdrawing opens the telescopic protector, which completely surrounds and shields the burner and mantle. Inside and outside the works, Mr. Helps was able to show lamps supplied by the high-pressure gas from the works installation; but the time of the visit was not, of course, a favourable one for demonstrating the efficiency. One lamp outside the works (whose brilliance is rather troublesome to a neighbouring electric arc lamp) gives an illuminating power of 2000 candles—at all events, each of the three burners tested separately, returns 800 candles on the bar.

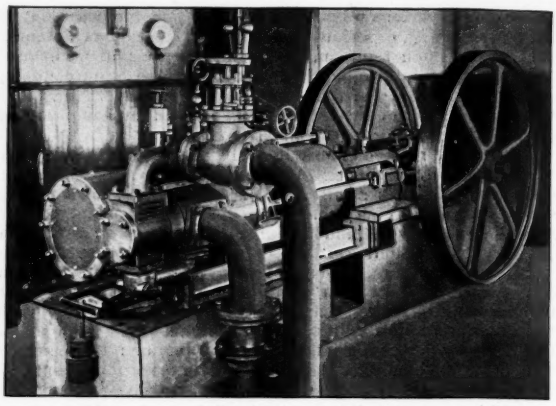


FIG. 5.—ONE OF THE COMPRESSORS SUPPLYING FIVE MILES OF MAIN.

The innovations that Mr. Helps had to show were by no means exhausted here. A sample of the new "Rotary" discount meter (recently described and illustrated in the "JOURNAL") for gas-fires, cookers, and other purposes was seen; and then the same kind of meter adapted for power contracts was exhibited. This is set to register the number of horse-powers used, based on any volume of gas that may be reckoned per horse power. In the case of the meter on view, it was set at 20 cubic feet per horse power (the setting can be varied); and so consumers can be charged so much per horse power. Mr. Helps considered that this meter would allow of an arrangement for gas supply being entered into with various cousumers, and that it would not be necessary for it to come under the Sales of Gas Act. He could not speak positively as to this; but he emphasized his belief that gas suppliers would be able to sell at so much per horse power through the meter without incurring any trouble with those in high authority. The meters, he testified, are very accurate when working on an engine. Inside the offices, patented lamps and fittings (inverted and otherwise) were shown alight, supplied with high-pressure gas, some of which are of Mr. Helps's own improvement. In one of the workshops, an old Parkinson cooker was shown in use with gas at 25 lbs. per square inch pressure. This is fitted with the President's adjustable needle taps, which are adjusted to the pressure, and then capped, so that the consumer cannot interfere with them.

VISIT TO ARBURY HALL AND ANSLEY COLLIERY.

While the members had known their President to be a man of many parts, they had never until this visit seen so far behind the scenes of his working life; and it is safe to say that they left the

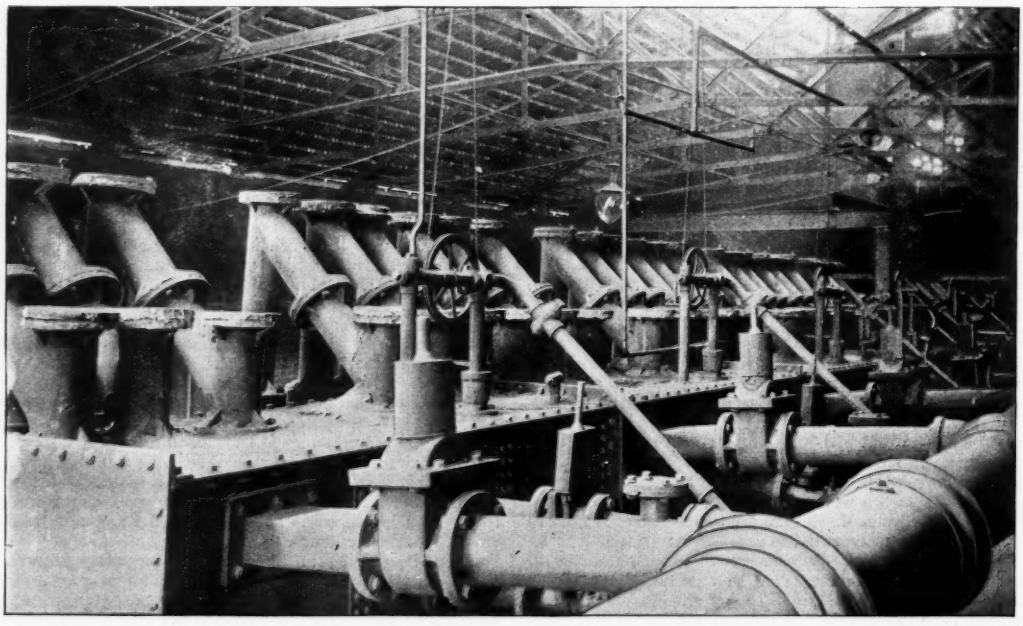


FIG. 4.—HYDRAULIC MAIN, ETC., SHOWING ATTACHMENTS FOR THE PATENT DISPLACING CHAMBER ARRANGEMENT.

works with their previous high appreciation of him much increased. It was full time that the next part of the programme was entered upon when the inspection was ended, and the members were fortified with light refreshments. The lowering sky and the considerable drop in temperature rather detracted from the drive, through beautiful country, to Arbury Hall—the seat of Mr. Frank A. Newdegate, M.P., who had kindly given his permission for the viewing of the house and grounds. Owing to want of time, the members were only able to make a rapid tour outside the historic, grand old pile and through the beautiful grounds; and then they continued their drive to Ansley Colliery, where they were received by Mr. W. G. Phillips, whose geniality and courtesy to the members were unbounded; and these excellent qualities were found to run through his whole staff. Directly the visitors arrived, a number enjoyed the excitement of descending one of the shafts, while the others inspected the machinery above ground. From a plan (exhibited in one of the engine-rooms) of "the connections, haulage, and cruts to Ryder seam," it was learnt that the shafts are 168 yards deep; while the depth to "Ryder" in pit was 68 yards, and length of crut 325 yards. The greatest depth is 540 feet. It was also gathered that there are about 450 men employed at the colliery, of whom some 320 work below ground. Another noticeable point mentioned by Mr. Phillips was that there have been no horses employed in the pit for the last sixteen years—all the haulage, winding, &c., being now done by electrical machinery. The fine electrical and steam machinery was inspected with a vast amount of interest, as was also the working of the huge screening and sorting plant and Zimmer conveyors, electrically driven. It was a pleasure to watch the ease and precision with which the work is accomplished by this plant. From the shaking screens, the various sizes of coal are delivered on to transverse plate or belt conveyors, and from them direct into coal-trucks underneath. The complete plant is capable of dealing with 1200 tons of coal per working day. Considerable enjoyment was derived from this visit by the members; and it certainly afforded for many of them a new and instructive experience.

On the same estate is Ansley Hall, now converted to the purposes of the colliery—principally for the enjoyment of the workmen. In the grounds, the visitors were photographed; and subsequently, in a marquee, they were entertained at luncheon by the Chairman, Vice-Chairman, and Directors of the Nuneaton Gas Company. It was late in the afternoon; but little cared the members, after their drives and the experiences at the colliery, by what name the generous repast provided for them was described in the programme. Their gratitude to the Chairman and Directors of the Company was expressed with no uncertain note before they left—the toasts which were proposed and honoured with due heartiness giving them the opportunity. In the thanks the President deservedly largely shared, for he had been the life and spirit of the day's visit; and moreover the Directors took advantage of the occasion to speak unstintingly of the value they placed upon his work for the Gas Company. Afterwards the visitors drove back to Nuneaton, having spent a day which will have for them many happy memories.

YORKSHIRE JUNIOR GAS ASSOCIATION.

The members of this Association very happily combined business and pleasure in arranging their meeting last Saturday at Hebden Bridge, which is in close proximity to the most charmingly picturesque scenery in the south-west of Yorkshire. It was an ideal summer day, and most of the members in travelling there availed themselves of the network of tramways belonging to the Halifax, Bradford, and Leeds Corporations, which enable travellers to reach Hebden Bridge from places 20 miles distant. Tea was served in the Hardcastle Craggs Valley, and the evening was devoted to exploring this and the neighbouring valleys, at the head of which are the great reservoirs of the Halifax Corporation Water-Works. The early part of the afternoon was spent at the Hebden Bridge Gas-Works, under the guidance of the Engineer, Mr. E. J. Wellens, and Mr. R. H. Ginman, the Manager of the Tyldesley Gas-Works, who was formerly assistant at Hebden Bridge. The works were described in the "JOURNAL" for Sept. 16, 1902 (p. 747), on the occasion of the meeting of the Manchester District Institution of Gas Engineers. The great interest of the visit was in seeing the difficulties of the position, and how they have to be met. The site is almost phenomenally crowded, and not only is an extension of the works practically impossible (situated as they are between a steep hillside and the main line of the Lancashire and Yorkshire Railway), but the widening of the line, now in operation, will very shortly annex all the coal-stores and some other buildings belonging to the works. Mr. Wellens gave an interesting and most useful account of some of his experiences; and the visitors agreed with him in the value of the juniors visiting works where difficulties and inconveniences abound, and in seeing for themselves in good time what they in their turn may have to face, possibly under conditions needing an immediate decision on the plan of action to be adopted. Prominent among the unusual circumstances connected with the works is the fact that, owing to the scarcity and excessive dearness of land, the only gasholder, except a small relief holder for the water-gas plant, is nearly a mile away, on the side of the works remote from the town; so that the gas, the make of which has doubled in about eight years, has to be delivered direct to the district without the intervention of a governor, and any excess of supply over demand backs up into the holder. The water-gas plant—a Humphreys and Glasgow set of 200,000 cubic feet per day capacity—which was in operation, was inspected with great interest, as was the rotary station meter connected to it.

The members then adjourned to hear Mr. W. Cranfield's address, entitled—

SOME SUGGESTIONS ON BEHALF OF THE JUNIORS.

Well might Dr. Wallace term the Nineteenth Century the "Wonderful Century;" and no part of it more fully merits the title than its latter portion. In all directions, and among all trades, great and rapid changes have been effected, and are daily developing before our eyes. Concentration of small businesses into large concerns, and these, again, into syndicates and trusts, the wonderful changes brought about by the increasing employment of machinery, the rapid displacement of the old-fashioned and out-of-date, the replacement of the good by the better, the keen competition and the accelerated pace of life, work, and thought, have wondrously transformed many of the aspects of our modern life and industry. These changed conditions and this accelerated pace have entailed new and severe demands upon the workers, both with head and hand; and those persons and institutions who are slow in getting abreast of the times, are apt to be left high and dry, as the one tide of their opportunity ebbs from them.

In some respects the gas industry has not had to bear the brunt of the strenuousness of modern conditions. Entrenched behind statutory powers, and with no fear of competition in the supply of their main commodity, English gas undertakings have not been so severely tried as those in America, where the permitted presence of very keen rivalry in the gas supply of towns has led to a series of forced economies and experimental changes resulting in some widely differing methods—as is seen, for example, in the fact that over 70 per cent. of the gas distributed in the United States is carburetted water gas. Is there any danger that this immunity should lull us into conservatism, a too ready continuance of old methods, or a too easy satisfaction with our results?

It has been a glory of the gas profession that it has afforded an open road for ability, and that we have in it many noble and inspiring examples of men who, with few initial advantages, have worthily risen to high place and great success by the sheer force of native ability, determination, and hard work. Now that the young men of to-day, and of yesterday, too, have opportunities never within reach of some of their seniors, will the way be as easy, or will competition be keener and the chances fewer? Will the sons be able exactly to reproduce their fathers' careers, or will they find that other times have brought other and widely different conditions? Are they in danger of being outrun in the race by those more keenly alive to modern possibilities? Must they therefore rest content with the opportunities within easy reach, or must they make opportunities for themselves? Will the prizes of the future be mainly for those who have not only familiarized themselves with present practice, but by an "intelligent anticipation of events" are ready for new conditions and able to develop new and unfamiliar types of plant, and thus avail themselves of the fruits of progress and invention?

These and similar thoughts have been simmering in many minds, and resulting in a conviction that something must be done and new departures made. Opportunities of utterance and means of translating conviction into action have been few; but arising from this attitude of mind among the juniors (and evidencing how widely-spread it is) has emerged, on the one hand, a growing attention to technical studies and the establishment of classes in gas manufacture, and, on the other, the various Junior Gas Associations—so striking a development of which has been seen in the past eighteen months. These have arisen spontaneously, and are the expression of a felt need. And here I may, on behalf of the Yorkshire Association, offer our congratulations to the youngest of these—that for Scotland—on its promise of a bright and successful career and our sincerest good wishes that this promise may be richly realized.

I am not here to justify the establishment of such Associations; they are here among us as a *fait accompli*. Nor is it my present purpose to deal with their mutual relationships and the possibility of their co-ordination or co-operation (though I hope that may soon be feasible, at least in the direction of publishing a collective yearly volume of proceedings); nor do I wish to deal with their relation to the Senior Associations. I am concerning myself to-day more with the juniors as individuals, and in the mass rather than with their organizations, and have referred to these latter only as an evidence of the felt need I have mentioned. We gratefully acknowledge the friendly advice and sympathetic attitude of many engineers with whom we have been brought in contact; and I am glad to embrace this opportunity on your behalf of thanking Mr. Townsend, the President of the Manchester and District Association, for the public and official expression, on the occasion of his recent Presidential Address, of that kindly interest and sympathetic friendliness for our Association, of which he has given ample evidence in his private capacity. We trust that our progress and work will vindicate his good opinion of our possibilities and amply justify his official benison.

As regards the Junior Associations, I will simply ask that they

may be allowed freely to develop themselves, to find out for themselves how, in their own districts and under the special local conditions (which I have found differ considerably), they can make themselves most useful to their members, and thus eventually to the profession. A more useful type, I think, is likely slowly to evolve from the experiences of several of these Associations working on their own lines than could be embodied in any formal scheme that could yet awhile be enunciated. Perhaps here it will be wise to make haste slowly. Engineers might, however, encourage their young men to attend the meetings and freely to take part in them, such action being quite consistent with the reticence that they may naturally be expected to preserve concerning certain details of the works where they are employed. I am inclined to think a few words of such encouragement would do a good deal to embolden them, and to promote the free and prompt discussion which Junior Associations often find it hard to secure, and in connection with which I am not sure that there is not some degree of uncertainty as to the extent to which their participation would be approved. The continuance of the kindness so readily granted, of permission to visit works, will, in itself, be a valuable assistance, and is a privilege greatly prized by the members, whose opportunities in this direction are, necessarily, so much more limited than those of their seniors. An additional vista of helpfulness opens up when we find a prominent engineer unfolding his stores of exceptional experience to a meeting of juniors, as was the case lately, when Mr. W. Doig Gibb, of Newcastle, lectured to the local engineering students on his experiences in erecting his new large holder.

But association meetings and discussions cannot take the place of systematic technical study, and will fail of their highest utility unless the majority, at least, of the members have thus previously prepared themselves. A most timely and well-informed paper was read by Mr. T. Berridge, of Leamington, before the Midland Association in 1901,* calling attention to the curriculum of what were then known as organized Science Schools in the various higher-grade Board Schools of the Midlands and Northern Counties (many grammar schools have now arranged a science side on similar lines under the inspection of the Board of Education, and all these schools are now known as secondary schools, "Division A.") Mr. Berridge accurately saw, and forcibly pointed out, that such schools provided a most fitting and helpful education for lads intended for the gas profession. I trust the seed he sowed fell on good ground. In any case, I can answer for it that, if the gas profession has not discovered and utilized these schools, some of them have found and utilized the gas profession, and in recent years have sent into it a number of most promising youths. These schools only aim at giving a suitable groundwork upon which a specialized technical training can be raised, and do not pretend to manufacture works chemists or trained engineers. They know their aim, and attain it.

There are those also who have had the inestimable advantage of such further systematic study as is embraced in a full science or engineering course in one of our modern Universities, or a complete and lengthy training and experience as mechanical engineers, before entering upon a gas-works career at an age when they were no longer lads; while others, again, who entered gas-works as youths, have been able to supplement their earlier training by evening courses at University Colleges. Such, in the main, have had success commensurate with their fitness, and have risen rapidly and to high positions. These will continue in still greater numbers to enter the profession, and to compete seriously for its prizes. For such students as these were, will be the proposed great Technical University that Lord Rosebery and his friends are wishful to establish in London as a kind of English Charlottenburg. An institution of this kind will be one source from which to obtain a supply of the highly-trained men, of deep, wide, and exact science, the need of whom among us was so powerfully emphasized by Professor Smithells in his speech to us last October. Happy are those who have had, or who have in prospect, such initial advantages. For most, however, it is otherwise; and I wish to plead for some of these, not underestimating the advantages of the fullest preliminary training, but facing the actual facts, and trying to see what can be done for the great majority—the less favoured, but promising and deserving ones.

Much stimulus has been given to these by the examinations in gas manufacture which are conducted by the City and Guilds of London Technological Institute, especially in those parts where classes have been available for preparation for these examinations. These have also reacted for good in prompting students to undertake and to persevere with the study of the necessary allied subjects. I do not pose as an apologist for every question paper set; but I do know that these examinations have been of permanent value to the profession. I hope the Institution will not seriously entertain the idea of superseding them or competing with them by examinations of its own. A multiplicity of examining bodies is greatly to be deplored, especially as the City and Guilds Institute has become the recognized authority for technical instruction, and is entering more closely into co-operation with the Board of Education and other educational authorities. It welcomes expert assistance and suggestion, and recently completely remodelled its syllabus in one subject under the guidance of a chosen body of representatives of the particular trade concerned. The Institution is thus in a position to secure any revision and re-organization that it deems necessary; and so any necessity for another set of examinations is obviated. On the one hand, with so many educational systems and institutions being in a state of flux, and on the other hand, a united and national Institution of Gas Engineers, the present time or the near future is opportune for any reconstructions in the existing scheme of examinations in gas manufacture.

Beyond minor re-arrangements of syllabus, I would suggest two alterations of considerable importance. When a subject of study is presented in two grades, the average student imagines that two years' work will cover it; and, in fact, it is rather difficult to arrange classes otherwise than on this basis. When the amount of work is too heavy thus to be generally managed, considerable difficulty arises, such as has been long felt in connection with most science subjects under the late Science and Art Department. I think very many of the past and present students would prefer the work to be spread out over three grades, with an easier first grade free from all questions on chemical tests. This would encourage many who at present are deterred from the examinations or discouraged by their results. These should have some consideration, because from just such students will appointments to the management of the smallest type of works be made. My other suggestion would be an extra and final stage, to which I will refer presently.

In the pursuit of their technical studies, two dangers loom up before our students—the neglect of preparatory and allied subjects, and insufficient work at them. The making of gas, as distinguished from its distribution, may be divided under three heads—commercial, engineering, and chemical. On the engineering side, we can easily call expert assistance to our aid, and the many firms of constructional engineers can supply up-to-date plant. But when their work is handed over ready for use, the skilful and scientific management of the plant is largely a matter of chemistry; and here, I think, we touch upon the weak link in our chain of technical instruction. At a recent meeting of our Association, the reader of a paper was sharply criticized for venturing to refer to insufficient washing of gas, and was reminded that he would find it hard to adduce cases of managers so careless of their interests as to give away anything of value in the way of recoverable ammonia. Dare we have an equally cheerful assurance that the same efficiency is obtained in other directions where the necessary check tests are less easy of application? Is the management of furnaces and the regulation of air supplies always as near the ideal as is the removal of ammonia? Are we quite sure that no available heat is ever going up the chimney, or being used in warming a needless excess of secondary air? Has the last word been said on condensation, or is there still a possibility that to the tar-well goes something that the consumer should receive, even as the tar-well sometimes fails to secure all the naphthalene which is its due? And so on round other processes. Besides, new conditions and new problems are arising, such as the growing importance of the calorific value of gas. Very many of these matters centre upon chemical tests, and the secret of their efficient handling is in the works laboratory—the key to much being gas analysis.

Lest I be thought rash or unduly pessimistic, let me quote from a paper on "The Conditions which prevail within a Carburetted-Water-Gas Plant," read before the Institution of Gas Engineers in May, 1901, by Mr. W. J. Atkinson Butterfield. Speaking of the special plant from whose working he draws his conclusions, he calls "attention to the fact that the plant was being skilfully operated under admirable supervision, and was actually affording unusually good results, lest his subsequent remarks on means by which it seems to him likely that even better results could be obtained should be misinterpreted as casting a reflection on either the design of the plant or on those responsible for the working. He believes that the design is unsurpassed at the present time, and that those concerned in operating the plant have acquired an unusual mastery of the essential details." But in the working of a plant which has called forth so handsome a testimonial for makers and operators, he finds that "the carbonic oxide discharged through the stack valve of the superheater represented 38 per cent. of the total heating value of the fuel consumed in the blows." After making full allowance for the inevitable differences between theoretically perfect working, and the maximum efficiency of practical working, and allowing for the "certain margin which must evidently be allowed to meet a sudden call for greater heat in the carbonizing chambers at any time," he declares that "there seems to be no question that from 20 to 25 per cent. of the heating value of the fuel consumed during the blows is needlessly wasted."

If under such favourable conditions a witness of such standing and authority found so large an unutilized margin, shall we not be justified in surmising that there is at least a reasonable possibility of some recoverable margin of unattained efficiency in many plants both for making coal and water gas. Mr. Butterfield's conclusions are reached as the result of analyses of samples of gas; and this emphasizes my contention that greater attention should be paid to this aid to judicious working, and that it will be all to the good if we can secure a great increase in the number of young men able to apply it. There are such, of course, employed at many works, where practice is thoroughly well-informed and scientifically guided; but in these cases, the works and their laboratories are not necessarily regarded as training grounds for all the employees who may wish to acquire a knowledge of such work and facility in its execution.

* See "JOURNAL OF GAS LIGHTING," Vol. LXXVII., p. 536.

If in times past we have had, as I hope to see in the near future, an array of trained and well-informed observers at the various points in works of all sizes and varying types of settings and plant, does anyone imagine that so many of our outstanding problems would still have been unsolved, or that we should be bewildered, as we are now on some matters, by the chaos of inadequate observations and seemingly contradictory evidence? To instance two—naphthalene and the relative efficiencies of horizontal and inclined retorts. In the latter case, how much of the contrasted statistics—*e.g.*, of coke available for sale per ton of coal carbonized—is vitiated by non-comparable working conditions (not to speak of divergences of practice as to how many hundredweights of coal are invoiced as a ton)? How many radical differences of working might we not detect if we knew particulars of the amount of carbonic acid in the generator gas, of carbonic oxide and oxygen in the waste gases, and the temperature at which these latter pass the damper? As for the former example, naphthalene, what progress has been made in dealing with it is all based on laboratory tests on the gas and the tar.

The President of the Institution of Gas Engineers has advocated the establishment of an official research works. Far be it from me to under-estimate the solid gains that would certainly accrue from it; but I suggest that the more pressing need is the raising of such a band of trained workers as I have spoken of, and that greater and speedier advantages would follow, especially as then fuller and wider use could be made of the results obtained by a subsequently established research works. Now, while many excellent institutions provide various evening classes for our young men, it is just at the point in practical chemical testing to which I have been referring, where real facilities stop; while necessarily large numbers of such students can at present have no possible opportunities of learning the manipulation of testing apparatus unlikely to be found at present in any but the larger works. I venture, therefore, in brief outline, to suggest a plan for which I beg the favourable consideration, in the first place, of the various Senior Associations.

Instead of isolated students pursuing this work under cramped and unhelpful conditions at their various local institutions, with, of necessity, comparatively meagre apparatus and occasional oversight and assistance, I would form one central class, in a town convenient of access, and equip it fully with all the apparatus to be found in the best works laboratories and that of all varieties of type—photometers, calorimeters, gas-analysis apparatus, &c., &c.—and place the class in charge of some gas-works chemist of high-standing, or with such a man to supplement the teacher on the regular staff of the Institution. In the equipment and maintenance of such a centre, many could easily co-operate. Whether or not a class of this description could be held in connection with, and on the premises of, any of the Provincial Universities, I cannot say, inasmuch as these hardly cater for occasional evening students. But if not, institutions of the rank of University Colleges are to be found. In Lancashire, the Municipal Technical School at Manchester rises to mind; and here, in Yorkshire, the Bradford Municipal Technical College is both a likely institution and is in a convenient geographical position.

County Councils make grants in aid of local classes for apparatus and general equipment; various other local authorities could probably assist in some way, especially as in most county boroughs the same authority has charge of education and of gas-making; and both the local Gas Associations and the parent Institution might with propriety subsidize such work from their funds. Grants towards class fees and travelling expenses might with advantage be made both by gas committees and the directors of private gas companies, so that they might avail themselves of the enhanced value of the services of some of their staff; while not a few engineers would probably be glad to utilize such a class for their articled pupils. I was glad to find that several gas companies united in assisting with grants the class in Gas Manufacture held during the last session at Newcastle; and I am the more encouraged to hope for some such help towards the class I have sketched, seeing that, so far as I know, all the other gas manufacture classes have been established and are maintained without asking for financial aid from the gas world.

I must say, here, that I have no authority to use the names of any of the institutions and authorities mentioned in connection with my scheme, as I have not communicated with them on the matter, and am, therefore, only speaking for myself. Incidental advantages of such a scheme would be that the gas authority of the town would have an additional testing station in its district, possibly at a good distance from its works of which it might arrange to have the use when necessary; neighbouring works would be able to arrange for investigations being conducted by members of their staff or by others in a laboratory more completely equipped, perhaps, than their own, and possibly to borrow special pieces of loose apparatus, such as calorimeters, &c.

I do not know if the generous offer from Messrs. Simmance and Abady of £300 worth of apparatus towards the proposed experimental works would in any degree hold good for such a central class; but such spontaneous liberality, coupled with my experience as a teacher of gas manufacture classes, of the kind readiness of makers of gas appliances freely to assist students and classes in any way in their power—kindnesses for which I gratefully and publicly acknowledge my obligation—encourage the belief that private generosity would be forthcoming to supplement official assistance, either in gifts in kind or in the establishment of scholarships. Several technical schools have been liberally subsidized by grants from some of the Companies and Guilds of the City of London—one of which provides the money prizes offered in connection with the existing examinations in gas manufacture. Further help might possibly, therefore, be obtained from some such source as this.

For entrance to such a class, I should insist on a due preparation, both in the study of chemistry and of gas manufacture. No one would desire the presence of persons who, with a minimum of general chemistry (perhaps acquired under protest), would wish to study the chemistry of gas testing—learning it mechanically, but not very intelligibly. No one would be wanted like the two historic examples of parents coming, I think, to the old School of Mines, in one case wanting his son not to be bothered about oxygen, hydrogen, &c., but just to learn copper; while the other only desired his son to learn how to find gold, and plenty of it. The Institution of Gas Engineers and the City and Guilds Institute might combine in drawing up a syllabus of work for such classes, covering all the tests and investigations ordinarily carried out in the best gas-works laboratories, and institute an examination—written and practical—the latter not confined to a few hours on some spare Saturday afternoon, but extending over two or three days, and held in the presence of the actual examiner, after the style of the Board of Education's (South Kensington branch) examinations in honours, part II., of certain science subjects. Certificates awarded on the results of such work, and after such an examination, would be an eagerly coveted diploma of great value both to the gas industry at large and to the possessors of them. They would have a distinct meaning, and would indicate a definite degree of executive ability and fitness for posts.

The immediate advantages of such training of their men would to many gas undertakings be marked, and in some cases measurable in "£ s. d.;" the incentive to study so as to enter such a class would be felt powerfully among all grades of workers; and there would be the additional allurement of the opening up of new possibilities to many of our young men in small gas-works. Such classes could only be profitably formed in the centre of a thickly populated area. Some four or five would be necessary; and the places are sufficiently indicated by the districts in which the Junior Associations have arisen, with the addition of Birmingham, where we hope to see such an Association soon formed. I do not imagine that a few such lessons are going to produce fully fledged gas experts, or that the ability to analyze flue gases is all that is necessary in handling a setting; but such classes may eventually enrich the profession with many who shall lay it under deep obligation in the future, and whose unsuspected possibilities might, but for it, have remained dormant.

I am happy in having been honoured with many confidences, from juniors and seniors alike, from various parts of the country; and these, combined with a pretty extensive knowledge and experience of gas students, enable me to judge how warm a welcome is assured if this suggested scheme could be carried out, how acutely the need is felt, and how eagerly many would avail themselves of it.

Peat Gas-Works for Electric Power Stations.—In a recent number of the "Zeitschrift für angewandte Chemie," Herr A. Frank dealt further on this subject, in continuation of his researches carried out a few years ago. Since then, great progress has been made in the development of large gas-engines capable of being worked with low-grade gases, and in the distribution and transformation of electric currents of high potential. Generator gas obtained from peat is stated to be quite suitable for use in these engines; and Herr Frank gave an interesting table showing the composition of fibrous and pressed peat, and of the gas and residual products obtained therefrom.

Waste of Gas in the Gas-Engine.—The two chief sources of waste in the gas-engine are the jacket water heat and the exhaust heat. It has been suggested that the jacket-water might be used as feed water for a steam-boiler, while the exhaust gas would serve to superheat steam on the way to a steam-engine. From tests made by an American student on a gas-engine of about 11-horse power and a steam-engine of about 3½-horse power, it appears that the temperature of the exhaust gases averaged about 730° Fahr. only; so that they were by no means hot enough to enable a superheater to act efficiently. The gain from the use of the exhaust gases was found in three tests to be 7·3 per cent., 18·9 per cent., and 14·9 per cent.; while the total gain from both gases and jacket heat was 14·2, 25·7, and 23·6 per cent.

"Fraud in Accounts."—Vol. 30 of the "Accountants' Library" (published by Messrs. Gee and Co., of Moorgate Street) consists of a treatise on the subject of "Fraud in Accounts," written by the Editor of "The Accountant." The book (which is somewhat on the same lines as the previous volumes of the series, several of which have already been noticed in the "JOURNAL") contains, among others, chapters on the functions and limitations of an audit, motives and methods of fraud, and specific instances of fraud, as well as an appendix of extracts from Acts of Parliament which constitute the more important provisions in the statute law relating to the matter. The subject dealt with is an important one to persons who are in any way responsible for the correct keeping of accounts; and the author has performed his task in such a way as should render the book of considerable value to those to whom it appeals.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Comparative Cost of Gas and Electricity.

SIR,—There appeared a few days ago, in the "Daily News,"* a letter on the above subject over the signature of Mr. J. H. Brown, of Nottingham, from which the following is an extract: "Or, in other words, electricity for lighting at 5d. per unit is equivalent to gas at 1s. 3d. per 1000 when consumed in the now obsolete flat-flame burner, or equivalent to gas at 4d. per 1000 when consumed in incandescent Welsbach burners."

This statement does not agree with the figures submitted by the writer, which, corrected to a 2s. 6d. standard, are as follows:

	Candle Hours.
Electricity at 5d. per unit yields	1,500
Gas at 2s. 6d. per 1000 cubic feet yields by the flat-flame burner	3,168
Gas at 2s. 6d. yields by the incandescent burner	11,952

Therefore, electricity for lighting at 5d. per Board of Trade unit is equivalent to gas at (say) 5s. 3d. per 1000 cubic feet when consumed in the now obsolete flat-flame burner, or equivalent to gas at (say) £1 per 1000 cubic feet consumed in incandescent Welsbach burners.

Our electrical friends will, I have no doubt, lose no opportunity of using the lines I refer to, especially as it is so definitely certified by the writer in his concluding remarks.

Aldershot, May 28, 1904. R. W. EDWARDS.

P.S.—The flat-flame figures of Mr. Brown's are not quite correct; but, in my comparison, I have used them, to avoid confusion.—R.W.E.

SIR,—Mr. J. H. Brown's letter, published in the "Daily News," on May 25, contains the following somewhat extraordinary statement: "Or, in other words, electricity for lighting at 5d. per unit is equivalent to gas at 1s. 3d. per 1000 when consumed in the now almost obsolete flat-flame burner, or equivalent to gas at 4d. per 1000 when consumed in incandescent Welsbach burners." Granting that Mr. Brown's assumption that a unit of electricity consumed in incandescent lamps will take 4 watts per candle-power-hour, and will give 250 candle power-hours for a unit at 5d., I calculate that, with an incandescent gas-burner giving only 12 candle power per cubic feet, the price of gas would have to be something like 20s. per 1000 cubic feet, in order to give the same 250 candle-power-hours for 5d.; so that Mr. Brown's 1s. 3d. and 4d. per 1000 should have been respectively about 5s. and 20s. His letter has been widely copied, and, if uncorrected, is likely to cause misunderstanding.

West Bromwich, May 30, 1904. HAROLD E. COPP.

SIR,—In your issue of this week is published a letter written to the "Daily News" by Mr. J. H. Brown, the Engineer and General Manager of the gas undertaking of the Nottingham Corporation, containing some calculations he had made with the intention of refuting statements in an article which appeared in that paper on 23rd ult., which article was derogatory to the interests of the gas industry, and doubtless tended to mislead the public. Mr. Brown's letter might have been expected to elucidate many of the fallacies contained in the article; but it does not do so in several instances. Almost at the outset, a slight error is made, but sufficiently noticeable to cause the reader not to be very confident in trusting all that follows. One unit of electricity is correctly stated to be equal to 1000 watts, and that 746 watts will produce 1-horse power. "Therefore," explains Mr. Brown, "one unit produces a little *less* than 1½-horse power," whereas it obviously produces a little *more* than this.

With reference to lighting, Mr. Brown shows that, with electricity at 5d. per unit and gas at 2s. 6d. per 1000 cubic feet, for 5d. the following candle-hours may be obtained:

With electric incandescent lamps	250
,, gas flat-flame burners	528
,, gas incandescent burners	1992

But then he states that—electricity for lighting at 5d. per unit is equivalent to gas at 1s. 3d. per 1000 cubic feet when consumed by flat-flame burners, and 4d. per 1000 cubic feet when used in Welsbach incandescent burners. It appears, however, that, in order to be equivalent to electric incandescent lighting at 5d per unit, the price of gas would have to be fully 5s. 3d. instead of 1s. 3d. per 1000 cubic feet when consumed in flat flame burners, and 19s. 11d. instead of 4d. per 1000 cubic feet when consumed in incandescent burners. It is difficult to imagine how Mr. Brown's results were obtained, unless he has divided where he should have multiplied; but this is the usual mistake of the electrician, not of the gas engineer.

The figures, which must have severely taxed the discernment of the public, remind one of an advertisement in which it is stated that the cost of gas lighting by a certain method is 120 *per cent.* cheaper than by the fishtail burner. If it was only 100 per cent. cheaper, its cost would be *nil*. Evidently we have at last reached the millennium, so far as gas is concerned; but this only makes Mr. Brown's calculations more difficult to understand. Therefore, I send you those of

June 2, 1904. A NORTH COUNTRY ASSISTANT GAS ENGINEER.

With reference to the matter dealt with by the above correspondents and others who have addressed us thereon, the following explanatory letter from Mr. Brown, dated the 28th ult., was inserted in the "Daily News" on Thursday: "I have received letters from various parts of the country requesting me to correct the very obvious error in the eighth paragraph of my letter of the 23rd inst., which should read: 'Or, in other words, electricity for lighting at 5d. per unit is equivalent to gas at 5s. 3d. per 1000 cubic feet when consumed in the now almost obsolete flat-flame burner, or equivalent to gas at 19s. 9d. per 1000 cubic feet when consumed in Welsbach burners.'"

* The letter referred to was reproduced in the "JOURNAL" last week (p. 587); and a correcting letter from Mr. Brown to the "Daily News" is referred to below.—ED. J.G.L.

The Annual Picnic at Middleton.

SIR,—You have made an "Editorial Note" this week to which I must raise a slight objection.

In the first instance, my men do not cadge, as this is strictly forbidden both by myself and the Gas Committee.

Secondly, I am highly indignant at any firm resorting to the publication of a note sent privately; for if they do not wish to give a small amount why cannot they do the same as several other firms have already done—write and say that they do not give to these picnics (which in this district are very common). We do not wish for any sum, however small, to be sent unless willingly.

Thirdly. I am not in favour of this means of having a trip; but the only way of putting an end to them is for the firms themselves to unanimously refuse to subscribe, and I am sure all the engineers will help them. As long as some firms come and ask when the date is, and offer sums of money, I cannot see how the publication of one or two letters will at all help. I have already seen no less than six letters from various towns sent to a firm in which I have a small interest.

As long as these trips are taken, I think (and I am not alone in this matter) that the engineers should know exactly what is taking place and so prevent scenes like some trips have been in past years at works which are much larger than Middleton.

I may say, in conclusion, that nearly every year some members of the Gas Committee journey with the trip, and also subscribe generously towards the expenses.

Gas-Works, Middleton, June 3, 1904. E. E. J. ANDERSON, Engineer and Manager.

[No comment on the above letter is necessary beyond again calling attention to the fact that Mr. Anderson's name appeared in the "picnic appeal" published last week (and to which we took exception) as one through whom contributions towards the expenses of the outing could be sent. It may further be stated that there was no indication on the circular letters sent to the "JOURNAL" office by firms who had been "favoured" by the attention of the authorities at Middleton, that they were to be regarded as private communications, as our correspondent suggests. Had the letter been marked "private," this would also have marked the depth of those responsible for its sending out in taking advantage of such means of covering their action. —ED. J.G.L.]

Coal and Water Gas from Vertical Retorts.

SIR,—I have read Dr. Bueb's specification and your remarks thereon. Many inventors have claimed the making of water gas direct from coal-gas retorts; the chief operators being Messrs. Jones, Evans, Rowan, and Crutchett (see "Abstracts of Specifications").

I would like to offer a short account of the experiences with the vertical retort at the Exeter Gas-Works. In the latter months of 1901, many experiments and tests were made in the production of water gas from the charge of coke in the vertical retort—passing both coal and water gas through the ordinary coal-gas plant. The charge of coal (slack) usually dealt with was 3½ cwt., giving a yield of coal gas equal to 12,000 cubic feet per ton, without carbonizing the tar. From the residual coke from this charge we were able to bring the make up to 14,285 cubic feet to the ton by the addition of water gas. One test made on Nov. 16, 1901, gave exactly the above rate—viz., coal, 3½ cwt.; coal gas, 2100 cubic feet; water gas added, 400 cubic feet.

It would require very lengthy explanation to give a detailed account of the different methods and conditions under which water gas was manufactured. It was made at rates varying from 2 to 20 cubic feet per minute. A small Root's blower was fixed for blowing up the charge. This, however, was quickly dispensed with, as it was found unnecessary to use it. In the earlier part of the experiments, the steam was used direct from the boiler; afterwards it was superheated, and found more beneficial in many ways. Steam was admitted into full charges and half-charges; and the "two-stage" system of which Dr. Bueb speaks was fully tried and given up for a better method. The best results were obtained by admitting steam in very small quantity, when about one-third of the slack had been fed into the retort; and as the plungers went on feeding the remainder of the charge, the steam was allowed to remain on.

I presume Dr. Bueb has satisfied himself that totally different results are obtained by "dumping" in the charge, instead of putting it in at the rate of 1 lb. to 1½ lbs. per minute. It was thought that we should find a great loss of heat in the retort; but with a judicious use of steam, there was no appreciable difference.

The difficulties encountered were many, which need not here be recounted. The effect on the illuminating power of the whole volume, the damage done to the retort, and more especially the coke, brought the conclusion that "the game was not worth the candle."

Exeter, June 4, 1904. T. SETTLE.

Modernizing the Farnworth Gas-Works.—For some time past, the Directors of the Farnworth and Kersley Gas Company have had under consideration the desirability of introducing regenerative furnaces at their works; and visits were paid to Bolton and other places, with a view to obtaining the most approved appliances. At a meeting of the Directors last Tuesday it was decided to go on with the work as soon as possible. Part of the present buildings will be taken down, and an extensive transformation will be effected. Besides other advantages, there will, it is anticipated, be much economy in production, and a saving of labour by the adoption of mechanical stoking.

THOMAS GLOVER & CO., LIMITED,

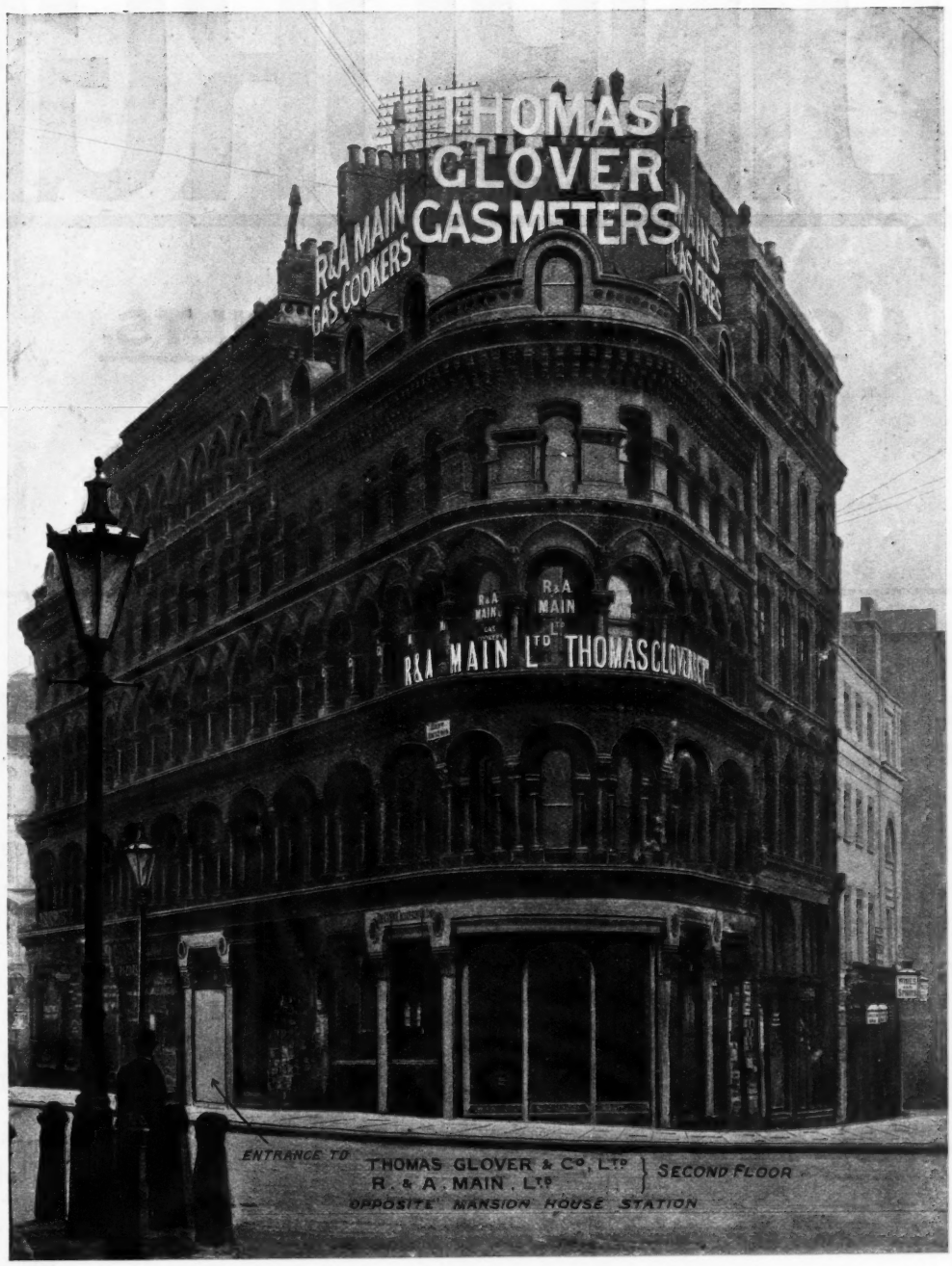
GAS-METER MANUFACTURERS,

AND

R. & A. MAIN, LIMITED,

GAS-STOVE MANUFACTURERS.

NEW CITY OFFICES.



LATE OF CLERKENWELL, NOW 49, QUEEN VICTORIA STREET.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 6139 Bank.

BRISTOL:	BIRMINGHAM:	MANCHESTER:	GLASGOW:	BELFAST:	MELBOURNE:
28, BATH STREET.	57 & 58, BROAD STREET.	132 & 134, CORN EXCHANGE BUILDINGS.	26, WEST NILE STREET.	8, EXCHANGE PLACE, DONEGALL STREET.	23, WRIGHT'S LANE, LONSDALE STREET.
Telegraphic Address: "GOTHIC."	*Telegraphic Address:* "GOTHIC"	*Telegraphic Address:* "GOTHIC."	*Telegraphic Address:* "GASMAIN."	*Telegraphic Address:* "GOTHIC."	
Telephone No. 1005.		Telephone No. 3893.	Telephone No. 6107 Royal.		Telephone No. 3718

SEE THE

EDINBURGH

CARBONIZING RESULTS.

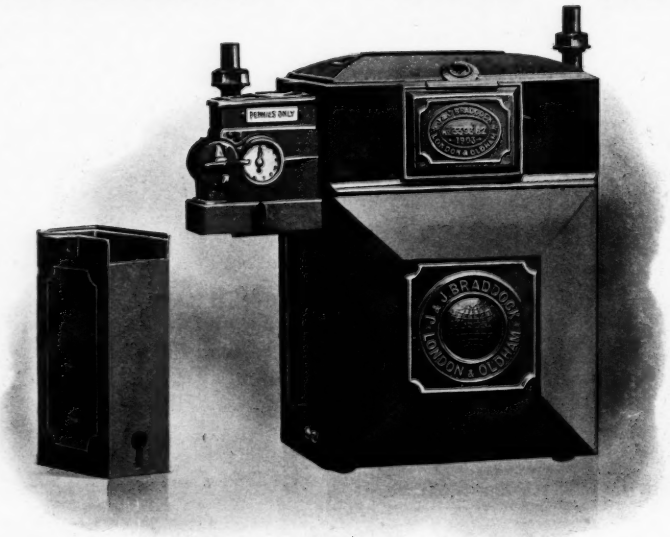
("JOURNAL OF GAS LIGHTING," May 31, 1904.)

BRADDOCK'S PATENT PENNY-IN-THE-SLOT
(ALSO SHILLING-IN-THE-SLOT)

PREPAYMENT GAS-METERS.

With Improved Cash Boxes made in one piece and most convenient in all situations.

The Attachments are detachable and are kept as distinct from the Meters as possible.



No. 256. Braddock's Tin-Cased Dry Slot Meter with Cash Box removed.

The **best Price Changer,** because the Cheapest, Handiest, and the most satisfactory in practical use, is

BRADDOCK'S PATENT CROWN CHANGE WHEEL.

ABSOLUTELY CERTAIN.

Descriptive Sheets upon application.

J. & J. BRADDOCK (BRANCH OF METERS LIMITED), **Globe Meter Works, OLDHAM,**

Telegrams: "BRADDOCK, OLDHAM." National Telephone No. 254.

AND 45 & 47, WESTMINSTER BRIDGE ROAD, LONDON, S.E.

Telegrams: "METRIQUE, LONDON." Telephone No. 2412 HOP.

REGISTER OF PATENTS.

Conveyors.—Little, A. J. S. B., of Smethwick. No. 11,358; May 19, 1903.

This improved construction and arrangement of the endless conveyor chain and buckets consists essentially of one double-link chain formed of two rows of links jointed together at a certain distance apart by joint-pins, which connect the two rows together. The buckets are mounted between the two rows of links, and swing on the joint-pins. They carry rollers mounted on the ends of the joint-pins outside the links; the carrying rollers or their axles having grease wells and adjustable caps, with means for operating them, so as to provide for the lubrication of the rollers while the conveyor is moving.

Charging Horizontal Gas-Retorts.—Gibbons, W. P. & G. B. A., of Lower Gornal, Staffs. No. 12,820; June 8, 1903.

This horizontal gas-retort charging apparatus is of the kind described in patent No. 10,414 of 1895, in which the coal falls down a vertical or inclined shoot terminating in a curved shoot placed opposite the mouth of the retort to be charged; the impetus acquired by the falling coal being sufficient to deliver the coal into the retort "in a practically even stratum, as required."

Fig. 1.

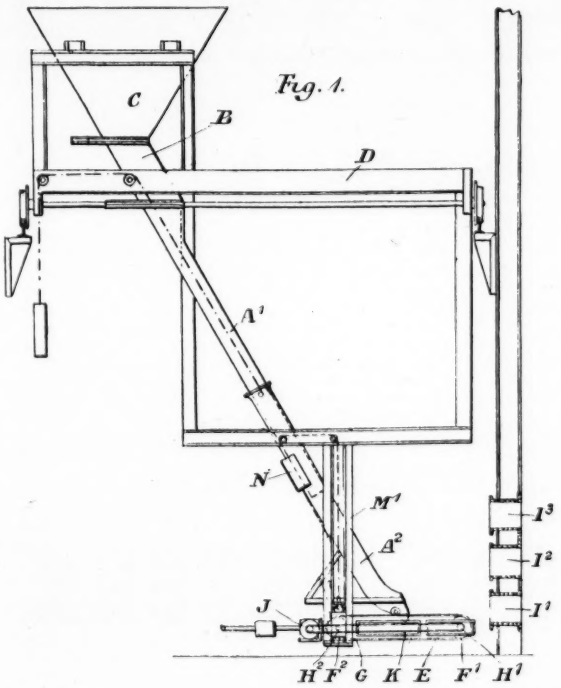
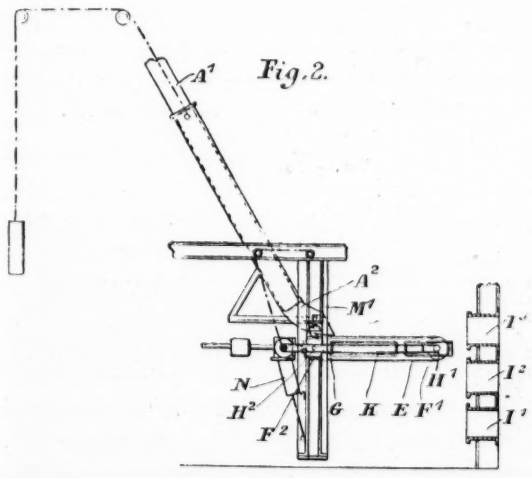


Fig. 2.



In order to charge longer retorts than was possible with the apparatus described in the earlier patent, and also to enable finer coal to be used and to save the loss of velocity in the curved portion of the shoot, the patentees now make the apparatus as shown. Fig. 1 is a side elevation, showing also the mouthpieces of one tier of three retorts. The apparatus is shown in position to charge the bottom retort in the tier. Fig. 2 shows some parts of the apparatus in position to charge the top retort in the tier. Fig. 3 is a side elevation on a larger scale. Fig. 4 is a front sectional elevation. Fig. 5 is a side elevation (partly in section) of a modification of the invention. Fig. 6 is a sectional end view of same.

A¹ A² is the inclined shoot down which the charge of coal is caused to descend from the measuring hopper B, which receives the charge from the overhead hopper C, as described in the earlier patent. These parts are carried by the overhead traveller D. Immediately below the retort mouth, at the lower curved end of the shoot A¹ A², is an endless carrying band E, which is (by preference) made somewhat wider than the width of the retort mouth. It is carried by, and passes over, the two pulleys F¹ F², the axles H¹ H² of which revolve in bearings in the swinging frame G, which can rock slightly about the axle H² of the pulley F² as a centre. The pulley F¹ is arranged somewhat in front of the retort mouth, and as near to the front of the mouthpieces I¹ I² I³ as convenient. The band E is driven by the electro motor J, which is fixed on the swinging frame G at the opposite side of the axle F², so as to partly counterbalance the fore part of the frame G. This motor, by the endless band K, drives on to a small pulley on the axle H¹ of the pulley F¹, so that the endless band E moves rapidly in the direction of the retorts (as indicated by the arrow in fig. 3) and assists in projecting the coal into the retort. The swinging frame G is preferably rather more than counterbalanced by the counterbalance weight mounted on the hand lever projecting at the back of the swinging frame G.

Fig. 3.

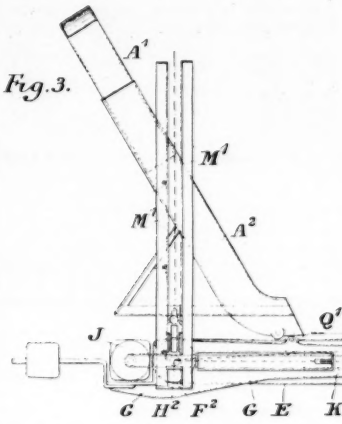
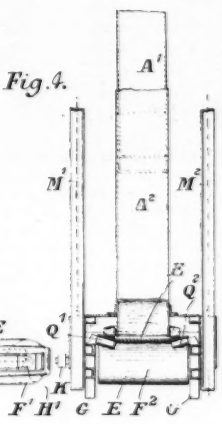
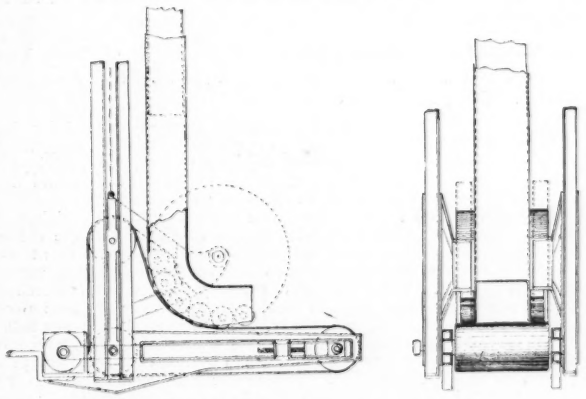


Fig. 4.



The lower part of the curved shoot is made separate from the upper portion, and is arranged to slide up and down it; so that the length of the shoot can be increased or shortened to suit the height of the particular retort to be charged. The lower part of the shoot is counterbalanced (or partly so) by the balance weight which is suspended on a chain carried over guide rollers and connected to the upper part of the shoot A². The bearing blocks of the axle H² are cast with a crosspiece to keep them square in the upright guides, M¹ M², in which they move. These bearing blocks also form the bearings of the rocking frame G; and the parts are made adjustable up and down the vertical guides M¹ M² to suit the height of the different retorts to be charged. The swinging frame G, with the pulleys F¹ F² and the endless band, and the electro motor and accessories, are nearly counterbalanced by the counterbalance weights N arranged at the sides of the uprights M¹ M², and are connected by a chain passing over guide rollers to the bearing blocks of the axle H², so that, by pulling the chain, the height of the swinging frame G, with the travelling band E and accessories, and the lower part A² of the inclined shoot, can be quickly raised or lowered. The apparatus can be fixed at the proper height by hooking the end of the chain N to any one of three hooks fixed on to the guide M¹ at different heights to suit the different retorts.



As the swinging frame G and its accessories and the lower part A² o the inclined shoot are raised or lowered, the latter has to move in an inclined direction up the inclined part A¹; and this is allowed for by the two horizontal side brackets fixed to the sides of the lower part A² of the shoot moving along the two rollers which are carried by pins on the upper parts of the bearing blocks of the wheel axle H². In order to avoid the spreading of the coal as it leaves the mouth of the inclined shoot, inclined side rollers Q¹ Q² are provided, carried by pins on the frame G, so as to turn up the edges of the band E. The band is caused to travel at a somewhat higher speed than that acquired by the coal in falling down the shoot; so that as the coal issues from the mouth its movement is accelerated by the endless band, and it is projected forward properly into the retort.

By means of the hand lever shown, the workman can raise or lower the swinging frame G slightly about the bearing H^2 as a centre, so as to vary the trajectory of the stream of coal and cause it to be deposited in an even stratum on the bottom of the retort. When the frame is raised high enough, the band E comes in contact with the two side rollers on the sides of the shoot, which prevent the band E from touching the bottom of the retort.

In the modification illustrated by figs. 5 and 6, an endless band takes the place of the bottom of the lower or curved shoot part of the apparatus. In this case, one side of the lower part of the shoot terminates as shown; but the other three sides are continued to the mouth of the shoot, and are of the same curved shape as in the arrangement already described. Fixed to both the vertical curved sides, and outside the shoot, are any convenient number of guide rollers, against which the travelling band runs, and which give the proper curved shape to it, so as to conform with the curved shape of the sides of the shoot. Thus the endless band itself forms the lower curved bottom of the shoot, and it passes over an additional pulley arranged above the other pulley, and has its axle carried by bearing blocks so as to move up and down the guides with the pulleys and the other parts of the apparatus as already described. The lower portion of the shoot is carried from the bearing blocks by side brackets fixed to it; so that the position of this lower part of the shoot relatively to the pulleys remains the same.

Treatment of Coke.—Beaven, E. S., of Warminster. No. 13,047; June 10, 1903.

The patentee describes a method of steeping coke to be used for drying alimentary substances in a fluid containing lime or other basic matter in solution or suspension, or both, in such manner as to approximately saturate the coke with the fluid for the purpose of fixing any arsenic there may be in the ash of the fuel when it is burnt.

It is desirable for this purpose, he says, that the coke should be immersed for a period of about two hours—being about the time required for complete saturation—in water to which has been added, and which contains in solution, or partly in solution and partly in suspension, lime or other basic matter which will become basic to arsenic on the application of heat.

The operation may be performed in any convenient manner. For instance, where the quantity of coke required to be treated is small, it may be placed in a cage or basket, and the whole immersed in a vessel containing the fluid. Where it is desired to treat large quantities, the fluid may be contained in a long tank or vessel—the coke being added at one end and withdrawn at the other; and the coke may be moved forward by hand or carried by a conveyor moving at such rate as to leave the coke immersed for the required time.

It is found that a suitable fluid is obtained by adding lime to water in the proportion of from 2 to 5 lbs. of lime to 10 gallons of water. It is desirable that the fluid should be prepared in a separate vessel. The unused fluid should enter the steeping vessel at one end and overflow at the other; and the quantity of fluid so passing should be approximately 100 gallons per ton of coke steeped.

An Incandescent Ceiling Light.—Freudenthal, L., of Berlin. No. 14,020; June 23, 1903.

This ceiling lighting arrangement with incandescent gas-burners, comprises, in combination: A hollow dish-shaped inverted cone body, fixed to the ceiling; a slot beneath the upper edge of the body; a horizontal partition separating the body into two compartments; holes in the wall of the body for admitting air to the burner; holes in the wall of the body below the partition wall, serving as exits for the gases from the flame; a shut-off device connected with the gas-supply pipe, arranged in the upper compartment; and a rod projecting through the slot beneath the upper edge of the cone body for operating the shutting-off device.

Gas Washing and Scrubbing Devices.—Kirkham, H., of Queen Victoria Street, E.C., and Chandler, S. A., of St. Leonards-on-Sea. No. 24,110; Nov. 6, 1903.

These improvements in apparatus of the rotary type used for the extraction of impurities from coal gas provide against the gas getting away unwashed from compartment to compartment, and principally applies to the joint between the collar casting or projection and the stationary division plate in order to prevent "slip of gas."

For this purpose, a sliding telescopic joint is provided, which will accommodate itself to any variation or altered position of the collar casting by following it either vertically or horizontally, and at the same time allow of a telescopic motion to cover any longitudinal movement of the shaft. The outer side of the projection, which is attached to the revolving frame plate, is machined, and upon the stationary division plate there is applied loosely, but for practical purposes sufficiently sound (as the faces are machined), a projecting ring, which is also machined on the inner side and which overlaps the revolving projection of the collar casting. This projecting ring attached to the division plate is so arranged that, should the shaft sink or slide or alter its position in any way, the overlapping ring also slides or moves correspondingly, and so "a practically sound telescopic and otherwise moveable joint is maintained and slip of gas prevented."

In the second place, the invention relates to tanks which enclose the revolving washing and scrubbing devices. Instead of having to use a number of cradles or supports to secure rigidity for supporting tubular cases, the patentees propose to make each end plate of a machine D-shaped, so that the bottom or straight part rests on the foundation. This arrangement, they say, provides a much neater and cheaper tank and an apparatus with fewer parts than now used.

The invention further relates to better securing and maintaining the spaces between thin metal sheets between which the gas passes, and which are made up into clusters or bundles in segmental form; a number of these forming a wheel to revolve in liquor within the divided tanks. Hitherto such thin metal sheets have been kept apart either by iron washers or stamped indentations, so as to obtain spaces. The proposal now is to use washers cut from bamboo rods, which, "being smooth, small, and cheap, and which slightly swell in water, provides the twofold purpose of keeping the clusters tight and preventing the least obstruction to the passage of the gas between the wetted surfaces, and so minimizing the lodgment of tarry or naphthalene deposits and consequent choking of the devices."

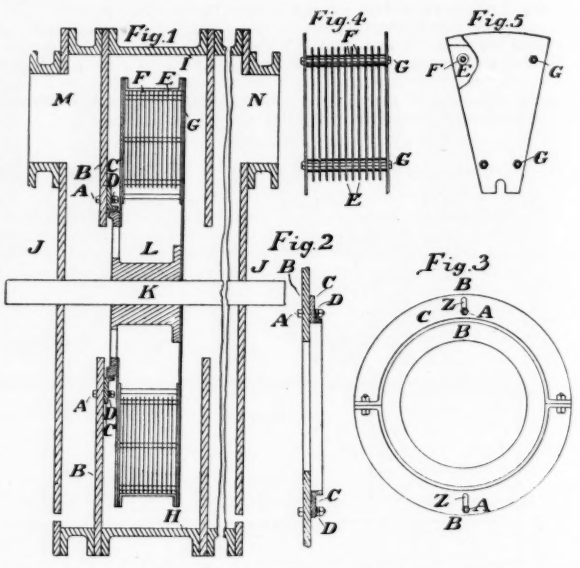


Fig. 1 is a longitudinal sectional elevation of one section of a complete washer-scrubber carried out according to this invention. A is the stud bolt screwed into the division plate B, passing through the telescopic sliding ring C and the spring washer D. E represents the bundles of sheet steel. F are the bamboo washers which keep the sheets apart. G (the dotted lines) indicates the bolts passing through the bamboo washers and holding the sheets together in clusters. H is the tank of the vessel; I, the cover; J, the end plates, which, although the vessel is cylindrical, are square at the bottom and rest upon the foundation to support the washer-scrubber in position. K is the shaft, and L the collar casting, which revolves within the telescopic ring C. M is the inlet for the gas; and N the outlet for clean water, which enters at the outlet end of the machine and leaves, charged with ammonia and other impurities, at the gas inlet of the washer-scrubber.

Figs. 2, 3, 4, and 5 are details of the various parts. Fig. 2 is a side elevation in section of a portion of the division plate and telescopic sliding ring attached. Fig. 3 is a front elevation (in part) of same; but Z indicates the elongated holes at top and bottom of the telescopic ring, which, it will be understood, allows the ring to travel and follow the collar casting should the shaft through wear sink in any degree, and so the space forming the joint is maintained without contact with the revolving collar. Fig. 4 shows the washing device built up with bamboo distance-pieces or washers, to keep the sheets of washing material apart. F are the bamboo washers; E are the thin sheets of steel or other metal plates; and G, the bolts passing through the bamboo washers for securing the sheets between the two outside plates. Fig. 5 is an elevation of the same broken away to show the bamboo washers as applied to the bundles of washing devices.

APPLICATIONS FOR LETTERS PATENT.

11,788.—Mallol, J., "Incandescent burners." May 24.
11,792.—Warry, J., "Inverted incandescent gas lights." May 24.
11,823.—Moeller, J., "Incandescent burners." May 24.
11,849.—West, J., "Charging retorts." May 24.
11,853.—Hillenbrand, J., "Suction gas plant." May 24.
11,875.—Wile, J. I., "Suction producers." May 25.
11,894.—Anderson, W. and H., "Inverted incandescent burners." May 25.
11,917.—Warburton, F. T., "Gas peat." May 25.
11,948.—Guilbaud, F. E., "Generating gas." May 25.
12,047.—Soutter, E., "Inverted burner galleries." May 27.
12,122.—Weyl, C., "Distillation of tar." May 27.
12,134.—The Wright and Butler Lamp Manufacturing Company, Ltd, and Darwin, H., "Incandescent lighting appliances." May 28.
12,135.—Bellamy, W., and Rose, A., "Bye-pass gas-cock." May 28.
12,155.—Farkas, A., "Incandescent lamps." May 28.

New Water Supply for Lynton.—An additional water supply for Lynton was formally turned on by Sir G. Newnes on Saturday week. The water is derived from the West Lyn, and after passing through a screening chamber is treated by means of a battery of automatic compressed air and oxidizing filters. The water is conveyed to Lynton by an 8-inch main, which is connected with the old service-mains. The cost of the scheme, which has been designed and executed by Mr. W. H. Chowins, the Surveyor and Engineer to the Lynton District Council, was £2500. Sir G. Newnes said the inhabitants ought to be grateful to the Council for carrying out the work so efficiently and for adopting a scheme which saved the great cost of filter-beds.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill read a second time and committed: Minehead Urban District Council Water Bill [Lords].

Bills reported: Chesterfield Gas and Water Board Bill [Lords], Local Government Provisional Orders (Gas) Bill, New River Company Bill [Lords].

Bills read the third time and passed: Local Government Provisional Orders (Gas) Bill, Lytham Improvement Bill, Yorktown and Blackwater Gas Bill [Lords].

UNOPPOSED BILLS COMMITTEE.—Thursday, June 2.

New River Company Bill.

This Bill, which is "to make provision for the application and distribution of the water stock issued to the New River Company in discharge of the sum appointed as compensation for the transfer of their water undertaking to the Metropolitan Water Board, for the reconstruction of the Company, its registration as a limited Company, and for other purposes," was considered to-day by a Committee presided over by Mr. JEFFREYS, the Deputy-Chairman of Committees.

Mr. FRERE, Parliamentary Agent, after explaining that the shares of the Company, King's and Adventurers'—which were the only form of security of this nature treated as real property, had become divided and subdivided into fractions, said the present Bill was introduced, in accordance with the provisions of the Metropolis Water Act, 1902, to arrange for the distribution of the water stock issued to the Company in discharge of the sum apportioned as compensation for the transfer of their undertaking to the Metropolitan Water Board among the owners of the shares, and also for the reconstitution of the Company as a Land Development and Management Company. Under the Bill, an Examiner of Titles would be appointed, whose duty it would be to settle claims to the water stock, and to arrange for the continuance of the Company in regard to the portion of the undertaking not transferred to the Board, consisting of landed estate, houses, and property not connected with the water supply.

The CHAIRMAN asked whether the shares of the Company were to be merged in the stock of the Board.

Sir J. HOLLAMS, Solicitor to the Company, replied that, except as to the new shares authorized by the Act of 1866, the shares were merely fractional parts of the freehold property.

The CHAIRMAN: And those parts are outside the funds of the Board?

Sir J. HOLLAMS: Not wholly. The Company own much property which has nothing whatever to do with the water undertaking. This property, ever since the Act of 1871 regulating the Metropolitan Water Companies, has been kept distinct, and now the Company will go on, having nothing whatever to do with the water supply, to manage and develop their landed property.

The clauses were then gone through; and, the preamble having been proved, the Bill was ordered to be reported for third reading.

Increased Storage at Darlington.—Last Wednesday, the Mayor and Corporation of Darlington visited the gas-works and inspected a new tank and holder which will cost about £22,000 out of a total, when the old works are re-arranged, of about £70,000. Alderman Barron, the Chairman of the Gas Committee, led the party round the works, and into the tank, which has been built, with the gasholder, under the direction of Messrs. Hawksley. The diameter of the tank is 143 feet, with a depth of 30 feet; and it will hold 2¼ million gallons of water. The diameter of the gasholder is 140 feet; and there are three lifts of 30 feet each, rising to 90 feet. The capacity is 1¼ million cubic feet. The present output of gas, independent of the new plant, which will be brought into operation before next winter, is 1,650,000 cubic feet; and the present storage capacity is 900,000 feet. A wall by the side of the river is to be built to prevent the works being flooded. The Contractors for the work were Messrs. Smith Bros. of Burnley.

Metropolitan Water Board.—Last Thursday, the Chairman of the Metropolitan Water Board (Mr. R. Melville Beachcroft) gave a dinner, at the Trocadero Restaurant, to the members of the Board and the chief officials of the Metropolitan Water Companies. Among the company were Mr. W. B. Bryan, Mr. James Searle, and Mr. Walter Hunter. After the loyal toast, the Chairman proposed "The Officers of the Metropolitan Water Companies." He remarked that it had been an advantage to members of the Water Board to obtain what he might almost call a microscopic knowledge of the history and financial position of the great water undertakings which had for the past century served the citizens of London and the surrounding districts, and also to make the personal acquaintance of those who for so many years had zealously, carefully, and successfully conducted the affairs of these undertakings. They had also learned a few lessons, chief among them being that if the Board were to be successful in the control and administration of the water of London, they must trust, and trust implicitly, those who had a technical and intimate acquaintance with the subject of water supply. They felt practically assured that they would have the allegiance as well as the service of those he saw around him. Mr. Searle responded. Mr. Hunter proposed "Success to the Future Administration of the London Water Supply," to which Mr. J. Glass (the Vice-Chairman of the Board) responded. "The Health of the Chairman" was proposed by Sir John Hollams.

MISCELLANEOUS NEWS.

PRESENTATION TO MR. C. CROWTHER SMITH.

At the Offices of the Southampton Gas Company last Thursday, in the presence of a goodly number of the employees in various departments, Mr. C. Crowther Smith, who, as our readers are aware, has retired from the position of Secretary, after 39 years' service, was the recipient of a gratifying testimonial of the respect and esteem felt towards him. It consisted of a handsomely illuminated framed address (containing the borough arms, Mr. Smith's crest, a view of the Company's offices, and their seal) and an adjustable easy-chair. Mr. S. W. Durkin, the Company's Manager, presided, supported by the Secretary (Mr. E. W. H. Eady) and Mr. Crowther Smith.

The CHAIRMAN said he had been asked by his friend Mr. Eady, as, he was afraid, the senior officer in the Company, to make the presentation to Mr. Smith. There was not much difficulty in accepting the position, but there was to find words to express his feelings and that of those present. It had been his pleasure to know Mr. Smith for a great number of years; and he might say that, through all their business relations, it had been a most pleasant time. Mr. Smith had always been ready to assist him; and he acknowledged the help that gentleman had been to him in his business life. He could not have a better man to follow, because they all knew the sincere work he had put into the duties of the secretaryship to the Company; and they had both seen it rise from a state, he was going to say of decadence, to one of great prosperity. It reflected great credit upon their friend for the position to which it had attained during the time of his tenure of office. He was very pleased that they had him still among them; and, therefore, while they congratulated him on his successful career as Secretary, they also congratulated him now that he was a Director of the Company of which he had been so able a servant and officer. He (the Chairman) would not enlarge on these matters, but would read the address, which had been so beautifully prepared by an officer of the Company (Mr. J. J. Leach):—

> Presented, together with an adjustable chair, to Charles Crowther Smith, Esq., F.C.I.S., by the members of the office staff, on his retirement, after 39 years in the office of Secretary of the Southampton Gaslight and Coke Company, as a token of the great respect and appreciation in which he is universally held by them, and in recognition of his unvarying kindness to all those under his control. They desire to congratulate him upon his election as a Director of the Company, and are glad that this appointment will enable him to continue his association with it. Uniting in most hearty wishes for the renewal of his health, they earnestly trust he may long be spared to enjoy his honourable retirement.

In conclusion, he asked Mr. Smith to accept the testimonial (to which were appended the names of the donors), not for the intrinsic value of the gifts, but as a sincere expression of kindness on the part of the subscribers.

Mr. EADY, on behalf of the office staff, added a few words; stating that everything contained in the address was sincere. It was nearly 29 years since it was his good fortune to make the acquaintance, in a subordinate capacity, of Mr. Smith; and during the whole of that time he always considered him to be most just, and an example to be followed, in addition to which he was very courteous and kind. He hoped that in his retirement, Mr. Smith would have renewed health and strength, and would be long connected with the Company.

Mr. E. BANCE added some appreciative remarks on behalf of the collectors.

Mr. J. H. ACFIELD stated that, having been associated with Mr. Smith for upwards of 40 years, he took a deep interest in the proceedings. In the December quarter of 1865, there were three collectors in the service of the Company, and the books issued to them were seven in number. At present there were about 25 collectors, irrespective of the prepayment department. He pointed out that the old system was to charge for every burner; but the Company had no reason to regret the adoption of newer methods of gas supply.

Mr. CROWTHER SMITH expressed his sincere thanks for the very cordial way in which the compliments passed upon him had been received. It was, he must confess, a great pleasure to feel that every department over which he had had the honour and privilege of presiding had evinced so spontaneous and hearty a feeling towards him in his retirement. He could only say that it would be impossible for anyone on retiring to receive a greater compliment than he had done—first at the hands of his Directors, because it was entirely unsolicited and unexpected on his part. The very handsome and beautifully expressed presentation just made certainly went to his heart, and it would be a lasting memorial to him as long as he had the pleasure of looking upon it. Mr. Durkin and he did their best to put the undertaking in the position in which it now was. The price of gas was formerly 5s. per 1000 cubic feet, and in some places 5s. 6d.; and though they had some people who still thought it ought to be cheaper, he could only say, if they remembered what each penny reduction cost the Company, they would be a little wiser and more careful in their expressions. The Company were now very prosperous; but in the old days one good gentleman who then had the management said to him that it was impossible for them, with all the extra capital put on by the new Act of Parliament, to pay a dividend; and he was so shocked at the prospect, and afflicted at the idea of the Company's future, that he resigned his position, and wished to get out as soon as possible, so as not to have any further responsibility. This was a good picture of the state of affairs at that time. The fact was that it required younger men to work the concern, and they, with the Directors, took a really broad view, with the result of their Consulting Engineer—Mr. Paddon—being brought on the scene with the present Resident Engineer (Mr. Durkin). They put the undertaking on a firmer basis; and it had now arrived at a very prosperous condition. He could only say it was a source of great gratification to him that, though he had

resigned the office of Secretary, he had been put upon the Board. He could assure them that the Directors were now as full as ever of energy, determination, and zeal to benefit all classes, and listened with patience and care to all representations made on behalf of any of the departments. He trusted the good wishes expressed towards him might be fulfilled; and he thanked them all heartily and sincerely for them.

A vote of thanks was accorded to Mr. Eady for what he had done in promoting the testimonial; and a smilar compliment to the Chairman concluded the proceedings.

THE MILLENNIUM LIGHT.

The "Millennium" light is going ahead; and there must be an expression of congratulation to the British Compressed Gas Company, Limited, on their successes. Among the important contracts netted by them has been one for the lighting of a section of the Plymouth Docks of the Great Western Railway Company. The Company are making a very big bid for the mail and passenger traffic; and they have achieved so much in the way of reducing the time in which London can be reached, that many of the German boats are now calling there. Previously, the lighting for such important docks was really bad; and electricity stood a fair chance of taking the field. But one of the Railway Company's Engineers hearing of the "Millennium" light, the Compressed Gas Company were asked to instal their system on Millbay Pier as an experiment. The favourable impression made by this resulted in successive orders for lighting the harbour platforms, Customs House, refreshment rooms, &c., with an extension towards the town. The Pontoon and Trinity Piers followed. On Monday night of last week, the Railway Company's Engineers inspected the lighting, and made a careful test of the whole system so far as it has been completed. The Compressed Gas Company had guaranteed to give a minimum illuminating power of 36 candles per cubic foot of gas consumed. The tests showed they were giving a total of 30,950-candle power for a consumption of 800 cubic feet of gas per hour, including the gas-engine used. Calculation shows that this works out to about 38·55 candles per cubic foot of gas. We have not seen the lighting; but report says that it is really magnificent, and the above test, and inspection of other installations, leave no cause for doubt. When the section is completed, there will be 45 outside lamps, each of from 700 to 1000 candle power. This success has naturally attracted the notice of several big firms in the locality, who are now contemplating the introduction of the system. The military authorities in the district have also been captured by the light; and it is being installed at the Granby Artillery Barracks at Devonport. A plant has been put down near the barracks meter-house in the Military Road; and the whole of the living blocks, men's recreation rooms, workshops, stables, infirmary, &c., have been connected up. The installation is to be running by July 1. It has been decided by the Commanding Officer to put the whole of the lighting system under the control of one meter; and the result is that a few days since specifications for a meter of very large capacity were sent out to, and tenders invited from, different meter manufacturers. In this way, it will be possible, should it be so decided, to extend from this compressing-station the system to Raglan Barracks. Another important piece of lighting which has fallen to the "Millennium" Company is in connection with the Terassen am Halensee in Berlin, which have been erected at a cost of over a million sterling, and are said to be the finest beer gardens in Europe. They were opened some three weeks since. This lighting was obtained in competition with electricity; and it is lighting of an unusual character, because there are towers and minarets about the place constructed of ironwork with coloured glass fronts, and the Company are lighting behind the glass. There are more than 500 lights on the terraces, of from 120 to 1000 candle power, and upwards of 2000 lights in the halls. There were something like 12,000 people present at the opening of this beautiful pleasure resort; and at dusk, when the whole of the lights were turned on from a distant bye-pass, there was a striking outburst of applause. It was really a grand sight. All the lamps have, by the way, been designed by the architects to harmonize with the building; and the effect is excellent. The Company are at the present time lighting the Deanery at Durham; and a proposal has been made to extend the system to the Cathedral and college. It is interesting and helpful, when the electrical people are putting forth most strenuous efforts, to hear of such large successes by gas as these installations represent.

Westphalian Coal for the Paris Gas-Works.—We learn that the Paris Gas Company are using coal obtained from Westphalia for carbonization purposes. It appears that the Company first made a trial of 40,000 tons of this coal, which was conveyed to Rouen *via* Rotterdam and Havre. Being satisfied with the results, they entered into a contract for the supply of 250,000 tons, to be delivered onwards from July of last year.

Widnes Water-Works Extensions.—At the Widnes Town Hall on Friday, Colonel A. G. Durnford, R.E., held an inquiry, on behalf of the Local Government Board, into an application of the Widnes Town Council for sanction to borrow £14,000 for purposes of their water-works at Stockswell. It was explained that the Corporation owned two pumping-stations, one at Netherley and one at Stockswell. It is at the latter place that it is proposed to carry out various alterations and extensions, which will increase the pumping capacity from 1½ to 3 million gallons. During the last twelve months there has been a greatly increased consumption. Mr. Isaac Carr, the Gas and Water Engineer, explained the various plans which it is proposed to carry out, and said the quantity of water used in Widnes was abnormal. In most towns it was 30 gallons per head per day; whereas in Widnes it was 80 gallons. The works were being carried on at a profit, which last year amounted to £1443, and the previous year to £1572. At the close of the inquiry, the Inspector visited the Stockswell station.

BIRMINGHAM MUNICIPAL UNDERTAKINGS.

The Past Year's Working.

At the Meeting of the Birmingham City Council last Tuesday, consideration was given to the annual reports of the Gas, Water, and Electricity Committees, which were referred to in the "JOURNAL" for the 24th ult. (p. 523).

The report of the Gas Committee was presented by Mr. Bishop, who first moved the adoption of the recommendation of the Committee that the salary of Mr. Thomas R. Murray, Works Engineer at Saltley, should be increased from £400 to £450 per annum, out of which £50 was liable to deduction for rent of house, taxes, coal, and gas. He said that Mr. Murray entered the service of the Corporation two years ago, and had a good record. The proposal having been adopted, Mr. Bishop moved the next recommendation of the Committee—that the salary of Mr. G. Hampton Barber, the Secretary of the Department, should be increased from £1000 to £1200 a year. He pointed out that Mr. Barber had been in the service of the Corporation for nearly three-and-a-half years; and that he had made no application to the Committee, who were, however, perfectly unanimous in their recommendation. In addition to the ordinary duties of the office, Mr. Barber had made suggestions for the better working of the department, and for furnishing additional security against fraud. He had also made excellent arrangements in regard to the sale of coke, which had shown an increase in profit of £14,000. At one time, 60,000 or 70,000 tons of coke were stored by the department; and when it came to be removed, great depreciation in value took place owing to the amount of dust which was caused. An effort was then made to sell the coke in Birmingham; and though to some extent this plan partially succeeded, it became necessary each year to send huge consignments of coke to London. Owing to the cost of carriage, however, the profit on this head was materially reduced. By Mr. Barber's scheme, which had been to produce different kinds of coke required by customers, the output had been disposed of locally. Of the £14,000 increased profit, he attributed £10,000 to the scheme initiated by Mr. Barber. Some discussion took place on this proposal; but eventually the resolution was carried, with five dissentients.

In subsequently moving the approval of the Committee's report, Mr. Bishop remarked that the business was still extending. The increased output of gas during the year ended March 31 amounted to 121 million cubic feet, and over 7000 new consumers had been added, The capital had not been increased during the year. The revenue account showed that the amount expended for coal was about £21,000 less than in the previous year. This was a result anticipated when the price of gas was reduced, due to more favourable contracts. On a turnover of nearly £900,000, their bad debts only amounted to 1-12th of 1 per cent. He was sure that in any large business undertaking this would be considered satisfactory. The income from gas had decreased £21,600, which was due to the lower prices charged during the last six months of the year. The income from residual products had been satisfactory. The gross balance was £185,577; and it was the largest since the Corporation took over the undertaking. The net profit was not £46,677, as set forth in the account, but really £63,745. The explanation was that there was a sum of £17,000 standing in the Finance Committee's books as their share of the cost of the issue of Corporation stook. The Committee had forgotten this item; but Mr. Barber discovered it. They were paying nearly £800 a year into the sinking fund in respect of it, and the payment would have continued until 1942. The Secretary thought this bad finance; and as they had such a good balance this year, he recommended the Committee to pay off the £17,000 at once, and they had done so. If this had not been done, the net profit would have been as he had stated. They would be £800 a year better off for the next 42 years. Mr. Jones seconded the motion; and Mr. Marsh having expressed the opinion that the charge made to small consumers was disproportionately large as compared with that made to large consumers, the report was adopted.

In dealing with the Water Committee's report, Alderman Parker referred to the leakage at Frankley reservoir. He said the facts were that in building a wall such as that passing through the middle of the reservoir, it was necessary to provide for expansion and contraction, owing to varying temperature. The provision made by their Engineers was that at intervals of 100 feet there should be a straight joint—an open space from top to bottom. There were nine of these joints. They were covered with asphalt, because this expanded with the temperature, and at the same time prevented leakage. The Engineers recommended that the reservoir should be emptied and examined before the Contractor was released. When half emptied, however, it was found that there was some leakage; and so the whole of the reservoir was cleared, so as to see what the trouble was. The joints were opened, and a gauge was fixed which showed something like 1½ million gallons of water running away per day. It would be a satisfaction to the Council to know that the structure of the wall was absolutely sound, and so was that of the reservoir so far as they knew. The leakage all arose from the water getting through the asphalt into the straight joints of the wall. The work of repair was being carried out, and they hoped it would be completed by the end of June. Though it was a matter for regret that it had arisen at all, they had reason to be thankful that it was discovered before the Welsh water came into the reservoir. He did not think they need have any misgivings as to the future. It was not a large matter; and the cost would be minute compared with the cost of the reservoir. It was for the Engineer to decide who should bear the cost—the Contractor or the Corporation. The more serious aspect of the case was that they were deprived of the storage of local water before they got the Welsh water. The report was approved.

The report of the Electricity Committee was presented by Mr. Ellaway, who stated that it was the most satisfactory one the Committee had prepared since the inauguration of the concern. They had sold during the past year 4,367,164 units, as compared with 3,737,419 units in the preceding twelve months. This was an increase of nearly 17 per cent., compared with 10 per cent. and 11 per cent for the two

preceding years. When he said the output for last year represented just about double what it was four years ago when the Corporation took over the concern, the Council would see that very considerable progress had been made. There was a net profit on the past year's working of £10,412; and, as large extensions were being undertaken on which interest and sinking fund charges will be payable before the works become remunerative, the whole of this has been carried to the reserve fund, making a total of £37,613 to the credit of the fund.

EDINBURGH AND LEITH GAS COMMISSIONERS.

The Question of Trading.

At the Meeting of the Edinburgh and Leith Gas Commissioners on Monday last week—the LORD PROVOST (Sir Robert Cranston) presiding—the Works Committee recommended, by a majority, that no action should be taken upon a letter received from ironmongers, plumbers, and gas-fitters, objecting to the proposal that the Commissioners should open three shops in Edinburgh and Leith as show-rooms, and for receiving complaints as to gas supply. The Committee also reported that, as authorized, they had leased three shops.

Bailie DOUGLAS moved disapproval of the recommendation with reference to the letter. He said the Commissioners were appointed by the Local Authorities of Edinburgh and Leith, and they did not hold any mandate from the Corporations who sent them there to enter upon municipal trading. But, further, the matter had been entered upon without the consideration which should have been given to it by any responsible body. He would prove his case from the minutes of the Commissioners. On June 9, 1903, the question of district show-rooms was brought up for the first time. The minutes stated that the Works Committee resolved to consider the advisability of having these rooms. But they had never considered the subject. If they had, he challenged the production of any minute of any Committee or Sub-Committee thereon. He therefore wrote the Clerk, in case there should have been any undisclosed minute on the subject, and his reply simply referred him to the minutes of the 14th of March of this year, in which it was stated that Sir Andrew M'Donald proposed that the Convener should be authorized to lease two shops in Edinburgh and one in Leith, to be used as district show-rooms and offices for receiving complaints, and that he (Bailie Douglas) moved that, before entering upon such an experiment, they should ascertain the cost and the revenue to be derived from it. They would see how much consideration had been given to a policy which might have far-reaching effects, and against which a large section of the trading community had objected. He deliberately stated that no information of any kind was laid before the Commissioners which would warrant any such step. They were aware that two shops had been taken; but they were absolutely in the dark as to what was to be the cost of the undertaking. This was not the first time that some official or Commissioner desired that shops should be opened, because he found that in April, 1897, a Sub-Committee resolved to recommend that the Commissioners should, as an experiment, authorize the renting of three or four shops to be used as show-rooms for cookers and the like. About a month afterwards—on the 31st of May—it was minuted that, after due consideration, the Committee resolved to recommend the Commissioners to delay renting shops, and that the recommendation was adopted. He thought they were proceeding without a mandate; and feeling that this was a serious departure, and on wrong lines, by the Commissioners, he had no alternative but to move that this part of the minute should be rescinded. In Manchester, where there were 18,000 gas-stoves in use, there was only one show-room; in Sheffield, where there was a large business, there was only one central show-room; and in Liverpool, where, he believed, the gas undertaking was one of the best in the kingdom, there was no shop or show-room. These places were only for the hiring out of stoves; but in Edinburgh they were doing work as well. He would ask the Engineer if it was the case that he had undertaken the removal of the gas-fittings of several churches, and the cleaning of them, without charge.

The ENGINEER (Mr. W. R. Herring) said that if they had not done so they must have had complaints about bad gas; and what they did was to show that these were due to bad fittings and burners.

Bailie DOUGLAS made bold to say that in any case where the fittings or burners had been condemned by the officials of the Commissioners, by the adoption of a cover, with ordinary burners, they could improve the lighting by about 50 per cent. This was altogether in opposition to the statement made by Mr. Herring that it was the fault of the burners.

The LORD PROVOST said he wanted the matter of the churches cleared up. Was it because of complaints about bad gas that the work in them was done?

Mr. HERRING: Yes.

The LORD PROVOST: And did you find that it was the fault of the fittings or of the gas?

Mr. HERRING: Of the fittings. It is our practice not to make any charge to the consumers for work of this character. I consider it to be part of our business as suppliers of an article which is a public necessity.

Bailie DOUGLAS went on to say that the district show-rooms were to be opened for the purpose of exhibiting a certain kind of burner, and to show that bad light was not the fault of the gas or the fittings, but was entirely due to the way in which the gas was used.

The LORD PROVOST: No; they are to show how beneficially the gas supplied in Edinburgh may be used with the fittings.

Bailie MALLINSON said the Commissioners had already decided to open shops, and the Committee recommended them not to take any action upon the petition of the traders. If Bailie Douglas wished this altered, he must give notice of a motion to that effect.

The LORD PROVOST said he was afraid this was so. He therefore ruled Bailie Douglas's motion to be incompetent, and called for the next business.

CHEAPER GAS AND HIGHER WAGES AT SALFORD.

At a Special Meeting of the Salford Town Council last Wednesday, the Chairman of the Gas Committee (Alderman Phillips) moved—"That from and after June 1, 1904, the minimum wages of the labourers employed at the gas-works be increased to 25s. per week; that from and after June 30, the supply of gas to consumers by slot meters be increased from 25 to 30 cubic feet for 1d.; and that from and after the same date the price of gas be reduced by 1d. per 1000 cubic feet to all consumers by ordinary meter. Members of the Council would, he said, be aware that Manchester had decided to pay a minimum wage of 25s. per week; and the places were too near together for them to have a different standard of wages. They had had a long period of harmony at their works; and they did not desire to have any trouble with their men, as they might have if Manchester's example was not followed. With regard to the decrease in the price of gas, they had had a good year, and could afford to make the proposed reductions.

Alderman Jenkins said he did not like to object to a resolution conferring benefit upon anyone; but he considered that when they did confer benefits they should do so upon the majority, not the minority. The reduction in the price of gas would affect the large consumers more than the small ones. He thought it would have benefited the majority of the ratepayers more if the profits had been devoted to the relief of the rates. The present price was not above that charged by Manchester; and he saw no reason why there should be a reduction. Mr. Muir said he took a somewhat similar view to that of Alderman Jenkins, and thought it would have been better not to reduce the price. They supplied gas to people who did not pay rates.

Alderman Phillips, in reply, said the idea seemed to be to squeeze as much money as possible out of the people, in order to give them relief in the rates. Such a policy would destroy any undertaking. If they raised the price of gas when the price of coal went up, they were bound to lower it when coal was cheap.

The resolution was carried.

BRADFORD CORPORATION GAS DEPARTMENT.

The Past Year's Working.

The Chairman of the Gas Committee of the Bradford Corporation (Alderman Hind) presented last Friday the following report on the working of the gas undertaking in the year ended the 31st of March.

It will be remembered that for the municipal year ended March 31, 1903, the total net profit of the Gas Department was £5123; but as the Clayton, Eccleshill, Idle, and Heaton gas undertakings were only purchased during that year, we had not to meet the full annual charges for interest and sinking fund. For the year ended March 31, 1904, however, we have, of course, twelve months' interest and sinking fund charges upon the loans for the whole undertaking. The increased sales of gas in the added areas during the year had been most encouraging. We cannot get the exact quantities of gas consumed in these districts for the year ended March 31, but for the twelve months ended Dec. 31, 1903, the gas sold in the North Bierley district showed an increase of 13·3 per cent., in the Clayton district 6 per cent., in Eccleshill 7·8 per cent., and in Idle 15·8 per cent. above the previous year. The average increase in the added districts was 10·89 per cent.; and at this rate of increase the consumption of gas will be doubled in less than seven years.

For the year ended March 31, the total quantity of gas sold was 1,879,625,000 cubic feet, being an increase of 2 per cent.; and 193,677 tons of coal were carbonized, costing £107,723, this being £4011 less than in the previous year. The average cost of the coal and cannel used was 11s. 1¼d. per ton, or a saving of 9¼d. per ton. The amount paid for carbonizing wages was £26,825, being an increase of £504; purification (less the amount received for spent oxide) cost £937, or a decrease of £22; and repairs of works and plant cost £26,703, or an increase of £3402, a considerable portion of which has been incurred by improvements at the recently-acquired works. Salaries amount to £5213, or £4 less; maintenance of mains, services, and meters cost £10,025, or £808 more; and meter inspection £3307, or £315 more. The total cost of public street lighting was £29,450, or £1112 less. Towards this the Finance Committee contributed £21,000; leaving £8450 to be borne by the gas consumers. The smaller cost of street lighting is due to a considerable saving in mantles, and to the fact that all the old lamps in the city have now been converted to our improved pattern. The cost of collection was £500; being the same as for some years past; but we have for the first time been charged £1000 by the Finance Committee for administrative expenses. Sundry expenses, including printing and stationery, amount to £1241, or £262 less. We save £91 in Directors' fees; and during the year bad debts amounted to £971, or a decrease of £255. Rates and taxes amounted to £12,740, or an increase of £1733.

On the other side of the account the receipts for gas were £191,892, being an increase of £4488, which is, of course, accounted for by the extra quantity sold; and the rental of meters produced £2233, or £37 more. Residual products have done well for us during the year. Coke has yielded £34,208, or £5139 more; tar produced £20,099, or £4995 more; and the receipts for ammoniacal liquor, together with the profits of the chemical works, were £19,639, or £4 less. Rents received, less rents paid, produced £658, or £263 more; and the profits of the gas-stove department were £385.

The gross or trading profit on the gas undertaking for the year amounts to £71,927, which is £12,901 more than in the preceding year, and £12,700 more than our previous record. The charges for interest and commission on loans, bank interest, and debenture stamps amount to £34,960, being an increase of £257; £2782 was charged for income-tax, being £185 less than for 1902-3; and the contribution to sinking fund for the year is £24,269, or £8036 more. The net profit on the undertaking for the year amounts to £9916, or an increase of £4793.

Last year we had a deficit of £1180, which has now been wiped out; leaving us with a balance of profits in hand of £8735. Our total capital expenditure on works at March 31 last was £1,125,512.

From these figures it will be seen that we have spent £4205 more on the maintenance and improvement of the works, plant, and mains, £1733 more on rates, and £8036 more on the sinking fund, besides having to meet a new payment to the Finance Committee of £1000; making a total extra expenditure of £14,974. I am sure the Committee will consider that we have done very well indeed to have a net profit of nearly £10,000, especially when the exceptionally long period of general depression in all branches of the Bradford trade is taken into account. The works have been materially improved out of revenue during the year; and the money spent in this way will bring in a good return in better working results.

WEST BROMWICH CORPORATION GAS SUPPLY.

Satisfactory Management.

At a Meeting of the West Bromwich Town Council last Wednesday —the MAYOR (Mr. A. G. Turley) presiding—the annual report on the working of the gas undertaking, noticed in the "JOURNAL" last week, was under consideration.

Mr. J. E. WILSON (the Chairman of the Gas Committee), in moving the adoption of the report, pointed out that the total expenditure in connection with the undertaking, including the amount of the award made at the time of the purchase of the works from the Birmingham Corporation, was £206,659. This, he said, had been reduced, by payments into the sinking fund and the redemption of stock, by £55,416, which left the capital standing at £151,243. In March, 1882, which was the first complete year of the undertaking after being taken over, the capital employed was £150,104; so that during 22 years they had had an increase on this item of only £1139. They ought to add to this the £8800 they owed to the bankers, which made the excess of capital at present £9900. The question naturally arose what had they got for the money. In the first place, in 1882 the sales of gas were 148,537,000 cubic feet, while in 1903-4 they were 328,032,182 cubic feet. Therefore they had more than doubled their consumption, and also the producing power of the works. This, however, did not represent all they had done. They had practically reconstructed the whole retort-house, and placed it on more modern lines, at a cost of some thousands of pounds; they had installed new machinery for stoking which would effect a great saving, and enable them to produce gas at a much lower price; they had built a station meter house which was very much larger than the first; and they had erected another gasholder which had double the capacity of the two which existed before. They had also put in new exhausting plant and added water-gas plant at a cost of £4000. They had spent on prepayment meters £22,000; and, in addition to the meters they took over from the Birmingham Corporation, they had laid out £10,000 on meters throughout the town. Their meter account now stood with only £1100 to the debit. So that really they had £9000 of assets which they did not reckon at all. When these things were remembered, the Council would be convinced that, so far as capital was concerned, the gas undertaking was on a sound financial basis. With regard to the profit and loss account, there was a total credit balance of £16,777, of which £5647 was to be disposed of by the Council; and the Committee asked them to allocate it in the following way: £1340 in aid of the general district rate for the current year, £2000 for office alterations and extensions, and the balance of £2307 to be carried to the depreciation and suspense fund account in reduction of the debit balance. A reassuring item in the report was the increased consumption of gas to the extent of a little more than 2 per cent. With regard to the prospects of the undertaking for the current year, he was afraid he could not say much of a cheery nature. They would have to spend £1000 for renewals at the works, and also £1000 upon the extensions of mains; while another washer would probably cost £700. The Committee had had the question of the price of gas before them; but they felt that they could not recommend any reduction. At the same time he would say, on his own responsibility, that if they could buy coal at a lower price than they anticipated, they might perhaps effect some reduction. He referred to the efficient management of the works by Mr. Copp, and congratulated him upon the excellent results attained. Their Secretary also (Mr. Hudson) had done his work well; and very much of the success of the undertaking was due to his care and attention.

Several members of the Council having joined in congratulating the Committee and the officials upon the gratifying results of the past year's working, the report was ultimately adopted.

Puttenham Water Supply.—The Guildford Rural District Council have decided to support the Wey Valley Water Company in their application for a Provisional Order for the supply of water to that portion of Puttenham which is within the area of the Godalming Water Company; the latter Company not having exercised the rights they possess in this respect. The Godalming Corporation are willing to hand over their powers to the Wey Valley Company; and the Puttenham Parish Council are also supporting the latter Company.

Gas Profits at Todmorden.—The annual statement regarding the Todmorden Corporation Gas-Works, which was submitted to the Town Council last week, showed that the past year's operations resulted in a gross profit of £10,421, and a net profit of £3663—compared with £2211 for the previous year. Since the works were acquired by the Corporation, about ten years ago, capital repayments and profits have amounted to £35,989. The Council resolved that in future 12½ per cent. discount should be allowed to all consumers who pay their accounts within one calendar month. Hitherto this discount has only been granted to large users. The change will cost the Corporation about £1200 a year, or nearly a 3d. rate, and represents a reduction of 5d. per 1000 cubic feet in the price of gas to small consumers.

GAS AND ELECTRICITY AT STAFFORD.

Increased Prosperity.

The report and statement of accounts of the Stafford Gas and Electricity Committee for the year 1903-4 indicate a condition of increased prosperity in both the departments under their care.

The amount of gas manufactured during the year was 179,660,000 cubic feet, and the quantity accounted for 174,013,192 cubic feet—an increase of 7,172,332 feet. The coal carbonized, and the coal equivalent of oil and coke used in the manufacture of carburetted water gas, under the supervision of the Engineer and Manager (Mr. Hubert Pooley), was 16,898 tons; the make per ton being 10,632 cubic feet of 16·65-candle gas. The loss by leakage and condensation was further reduced to 5,646,808 cubic feet, or 3·14 per cent. of the make, which is the smallest percentage loss in the history of the undertaking. Materials used in manufacture cost £9270, as compared with £9677 for the preceding year. Manufacturing charges showed an increase of £103, and distribution charges of £1553; the latter rise being due to the large expenditure on mains and service pipes incurred during the year. The total cost of coal and working expenses was £18,663, as against £17,703 for the previous year. The revenue from the sale of gas for private and public lighting was £22,847, or an increase of £1075. The amount received for coke was £4010, or an increase of £724; for tar, £1621, or an increase of £457; and for sulphate of ammonia, £1663, or an increase of £626. The sales of residual products together, which amounted to £7295 (or 78·7 per cent. of the cost of the coal), and constituted a record. The profit on gas-fittings amounted to £657; and, after deducting the cost of repairs, the rental of stoves brought in £95. The total revenue for the year was £30,895; and the expenditure, £18,663. There was therefore a gross profit of £12,232. Income-tax paid amounted to £394 15s. 9d.; interest on capital (including interest on overdraft), to £3176; and loans repaid, to £3851. Depreciation funds have been credited with £1927, and the bad debt reserve fund with £100. There was thus a net profit of £2783 on the year's transactions. Of this, the Committee recommend that £1500 be transferred in reduction of rates, £750 carried to the reserve fund, £50 given to the Free Library Committee, and the balance carried forward. The total expenditure upon capital for the gas undertaking is £115,947; being the same figure as last year. Loans repaid amount to £50,414, which leaves £65,533 still owing. The total paid out of the profits in aid of the rates will, with the sum proposed this year, amount £40,325.

The total revenue for the year from all sources in the Electricity Department amounted to £2879; and the total expenditure was £1332 —leaving a gross profit of £1547. Interest charges and loans repaid, however, amount to £1852; and, in addition, the Committee have decided to place £400 to depreciation fund for the renewal of cables, and £211 to the same fund to meet renewals to the battery. They have, therefore, decided to ask a contribution of £963 from the rates, being the amount of the loans repaid for the year. The total capital expenditure upon the department amounts to £30,337, and loans repaid to £5623; leaving the sum of £24,714 still owing.

BELFAST CORPORATION GAS SUPPLY.

The Prepayment Business.

At a Meeting of the County Borough Council of Belfast on Wednesday last, the Chairman of the Gas and Electricity Committee (Mr. J. A. Doran) gave some particulars in regard to the prepayment supply business of the Corporation. He said that, as had already been announced, the Committee had acted on a recent legal decision in arranging to give a liberal discount to all consumers of gas. Hitherto, according to the scale prescribed by the Act of 1874, consumers of less than 10,000 cubic feet per quarter received no rebate, and those whose consumption was between 10,000 and 50,000 cubic feet per quarter received an allowance of only 2½ per cent. For the future, all consumers whose accounts amounted to 100,000 cubic feet per quarter or less would receive a rebate of 5 per cent., conditional only on prompt payment. The number of gas consumers at the close of the financial year was £45,471; being an addition of 1585. There was an increase in the number of gas cookers and heating-stoves during the twelve months of 422; the total number of these appliances in use being now more than 10,000. As regarded the collection of the accounts, it was satisfactory to know that, out of a gas rental of £165,000, only £449 had to be written off as bad, practically only 5s. per cent. The demand for automatic meters continued unabated, and nine gas-fitters were kept in constant employment in the fixing of these meters. During the month of May, 639 applications had been received. The number at present in operation had reached 1126; and they had in hand no less than 391—making a total of 1517. It remained to be seen if this increase in the number of consumers would prove remunerative; but, at any rate, the Committee had the satisfaction of bringing the use of gas within the reach of a class of the ratepayers who were previously debarred therefrom, as in almost every case the automatic meters had been fixed in houses which had not hitherto had a gas supply, or in which the use of gas had been discontinued.

COVENTRY CORPORATION GAS UNDERTAKING.

In the report of the Gas Committee of the Coventry Corporation for the past financial year, they state that the total borrowing powers exercised since the acquisition of the undertaking amount to £319,840, of which £31,340 has been repaid. The present liabilities are therefore £288,500. Against this, the Corporation have reserve and sinking funds invested amounting to £25,274; leaving a balance of liability of £263,226. The sums expended during the year on capital account were: Structural works (Foleshill site) £19,799; new mains and services,

£10,665; new meters, £2263—total, £32,727. The total capital expenditure since the acquisition of the undertaking, including the original purchase money, amounts to £283,522. The balance of capital in hand is £36,318. The total revenue for the year amounted to £100,215; and the expenditure to £82,154; leaving a gross profit of £18,061. To this has to be added the amount carried forward, which makes the total £18,231. Against this are capital and other charges amounting to £11,764; leaving a final balance of £6467. The amount in the reserve fund, which the Council last year prescribed at a maximum of £10,000, is at present £9405. In considering their recommendation to the Council as to the disposal of the profits, the Committee feel bound to have regard to the report of their Engineer and Manager (Mr. Fletcher W. Stevenson) of Oct. 18, 1902, in which he states that the portion of manufacturing plant at the old works which would be discarded when the whole of the gas is manufactured at Foleshill would be about £50,000, and they are strongly of opinion that £4000 of the profits should be allocated towards meeting the loss which will inevitably occur. They accordingly recommend: (1) That £4000 of the profit be set aside to meet the loss of capital consequent upon the abandonment of plant at the old gas-works when the new ones at Foleshill are in full operation; (2) that £2000 be paid to the district fund; and (3) that the balance of profit of £467 be carried forward.

GAS PROFITS AT ST. HELENS.

In moving the adoption of the Gas Committee's minutes at last Wednesday's meeting of the St. Helen's Town Council, Mr. Shaw referred to the successful result of the operations of the gas-works during the past year. The net profits amounted to £11,817, which the Committee considered very satisfactory. The total quantity of gas made, however, did not show as great an increase as in past years, being only about 4 per cent., while they had been accustomed to 10 per cent. They were pleased to say that the number of gas-engines and prepayment meters used in the town was increasing; and these had helped to keep up the consumption of gas, which had dropped off owing to the closing of one or two works and collieries. In view of the rising rates, they handed over a much larger amount to the borough fund than last year—namely, £5000. A like sum had also been appropriated to the reserve fund, and £1658 to the capital account. He thought the Engineer and Manager (Mr. S. Glover) was to be congratulated on last year's results.

Mr. Rudd criticized the Committee's right to make enormous profits out of the poorer population of the borough. He said he found that the general increase of the amount made from the consumption of gas was from those people who used slot meters. The Mayor (Alderman J. Massey): Don't make a statement of that sort. You are stating something which is not correct. We try to do justice all round. Mr. Rudd remarked that these people had to pay 3d. per 1000 cubic feet more than ordinary consumers, and they ought not to be charged more. The Mayor pointed out that there was the extra cost of collection, and also other things. Mr. Shaw said that in other towns they charged considerably more for the slot meters than they did in St. Helens. In answer to a further question, he stated that the reserve fund of £26,000 had been spent on plant; but the Committee thought it desirable to establish an available reserve fund, so they had arranged to put £5000 to it.

The minutes were confirmed.

SMETHWICK GAS DEPARTMENT.

The Past Year's Working.

The report and statement of accounts in connection with the Smethwick Corporation Gas Department for the year ended the 31st of March last, which has just been issued by the Secretary (Mr. W. J. Sturges), shows that the working during this period was attended with gratifying success. The aggregate sales of gas increased by 4·27 per cent. The total quantity of gas sold was 333,992,300 cubic feet; being 13,677,900 cubic feet more than in the preceding year. The number of ordinary meters in use at the end of the year showed an increase of 70, and the prepayment meters of 799. The receipts for gas, residual products, fittings, &c., amounted to £53,413, £2746 more than before; while the expenditure was £37,630—an increase of £239. The gross profit was £15,783, which was a rise of over £2500. After making provision for interest and the sinking fund, there remained a balance of £5921, the net profit on the year's business. These figures show an increase of £2431. It is proposed to contribute £2000 to the district rate account, and to transfer the balance of £3921 to the depreciation fund and suspense account.

NEATH CORPORATION GAS UNDERTAKING.

Engineer's Annual Report.

At the Meeting of the Neath Town Council on Thursday, the Town Clerk read the report of the Gas Engineer (Mr. R. A. Browning), which showed that the undertaking is in a very flourishing condition. The gross profit on the past year's working amounted to £5066—an increase of £243, notwithstanding a reduction of the price of gas from 3s. 2d. to 3s. per 1000 cubic feet. This represented about £450; and but for it the profit would have been at least £6500. The residual products showed a good increase. Dealing with the profit and loss account, Mr. Browning showed that, after paying £976 interest on loans, &c., £200 had been carried to the depreciation fund account, and the repayment account received £2799 in reduction of the principal. In view of the favourable results obtained, and having regard to improved prospects, he said he could with confidence recommend the Council to hand over not less than £500 for the reduction of the rates when framing the November estimates, as, after meeting all the demands, there was an increase of more than £1000 in the profit and loss balance. The policy of the Gas Committee for many years had been to reduce the price of gas at every opportunity. When the Corporation acquired the undertaking, the price was 5s. 6d. per 1000 cubic feet; now it was 3s., and the consumption had been more than quadrupled. This showed that the policy was a right one, and had placed the gas undertaking on a sound footing. Now that the gas supplied to all customers was at a reasonable rate, he was of opinion that the ratepayers should have some recognition. Mr. Hopkin Jones (the Chairman of the Gas Committee), in moving the adoption of the report, warmly congratulated the Engineer upon the excellent results of his management. A question was raised as to the rate of payment of the stokers for Sunday work; but it was referred back to the Committee.

WIGAN CORPORATION GAS SUPPLY.

The Past Year's Working.

In the "JOURNAL" for the 10th ult., we briefly announced that the Corporation of Wigan had had a profitable year with their gas undertaking. This is borne out by the report presented to the Gas Committee by the Engineer and Manager (Mr. Joseph Timmins), and the abstract of the accounts for the twelve months ending the 31st of March, prepared by the Borough Treasurer (Mr. W. Trevor Wanklyn), which have just been issued. At the beginning of the financial year, there were 11,632 ordinary and 1799 prepayment consumers; at the close, the numbers were 12,081 and 3259—the total increase being 1909. The cookers increased by 126. The quantity of coal and cannel carbonized was 37,402 tons, or 555 tons more than in the year 1902-3; while the bulk of gas made was 425,319,000 cubic feet, or 6,803,000 cubic feet more. There were 392,028,000 cubic feet of gas sold for private and public lighting; 17,183,500 cubic feet being on the prepayment system, against 11,900,400 cubic feet before—a rise to the extent of 44·39 per cent. Nearly the whole of the additional consumption was by slot meters. In this connection, it is interesting to note that during the year 220 florins were taken from the boxes, and 116 of them were reclaimed; the others being returned to the consumers in exchange for pennies. The florins reclaimed had been knowingly put into the meter; thereby showing, in Mr. Timmins's opinion, the confidence of the consumers in the honesty of the collectors. Shillings to the number of 256 were also found, for which no gas could be obtained as they do not operate the mechanical arrangement. Here, again, the meter was used as a money-box. The yield of gas per ton of raw material was at the rate of 11,371 cubic feet. The residuals per ton were: Coke, 14·65 cwt.; tar, 13·58 gallons; and ammoniacal liquor, 38·59 gallons. The capital invested in the works is £358,202; being at the rate of £9 11s. 6d. per ton of coal carbonized, and 18s. 3d. per 1000 cubic feet of gas sold. The sale of gas and residuals resulted in a revenue of £74,975; and the expenditure was £45,055—leaving £29,920 to go to the profit and loss account. This was brought up to £41,760 by the balance standing over. Interest and sinking fund took £14,917; a sum of £3984 was charged for public lighting; £11,800 was transferred to the general district fund; and the balance of £11,059 has been carried forward.

REDUCTION IN PRICE AT NEWBURY.

The annual report of the Newbury Gas Committee, which was submitted to the last meeting of the Town Council, stated that the surplus on the working for the year ending March 31 amounted to £2106. Under these circumstances, the Committee recommended: (1) That a sum of £500 be contributed to the district fund; (2) that the price of gas to all consumers be reduced by 2d. per 1000 cubic feet, with the same discount as before; (3) that the quarterly rentals of stoves be reduced by 1s.; and (4) that the quarterly rental of prepayment stoves be reduced to 6d.

In moving the adoption of the Committee's report, Alderman Smith said they had had a most successful year; the profits having been the highest ever made by the undertaking. This satisfactory state of affairs was due to the improved manner in which the works were carried on, and the excellent plant they now possessed. During the twelve months, 5117 tons of coal had been carbonized, at a cost of 18s. 3d. per ton, producing 54,150,100 cubic feet of gas. The Committee and the Manager (Mr. W. R. Davey) were doing their best to maintain the efficiency of the works; and they believed the undertaking would continue to flourish. They did not fear the competition of other lights; and their progress during recent years had been uninterrupted. The suggested reduction in the price of gas would represent £350, and the reduction on stoves and meters about £50; while they also proposed voting £500 to the relief of the district rate. Mr. Beynon seconded the motion, remarking that on the gas-works the actual loan at the present time was £24,184, which was less than the price at which they were purchased by the Corporation; while their value had immensely increased. The undertaking actually possessed a working balance of £4297, in addition to £1380 invested in cooking stoves and similar assets. Alderman Long congratulated the Committee upon the successful balance-sheet, and expressed his agreement with the proposals to give £500 to the relief of the rates, and to reduce the price of gas. He pointed out, however, that only £500 was actually coming out of profits realized; the reductions being prospective, and not retrospective. He suggested, therefore, that, in face of the competition they were likely to encounter next year, there should be a general reduction of 4d. per 1000 cubic feet. He moved an amendment that the reduction be 4d. instead of 2d.; adding, as a further reason for doing so, that he should like to cut the ground from under the feet of the Electric Light Company.

Other speakers having taken part in the discussion, the amendment was put, when it was found that eight were in favour of it and eight against. The Mayor thereupon gave his casting-vote in favour of the amendment; remarking that he felt fully convinced that the Committee were in a position to make the reduction. The report, with this alteration, was then adopted.

TIPPERARY GAS COMPANY, LIMITED.

Annual Report and Accounts.

At the Annual General Meeting of the above-named Company to be held on the 14th inst., the accounts to be presented show that the sale of gas in the twelve months ending the 1st ult. produced a revenue of £3245, and that the total receipts were £4069. The expenditure on the manufacture of gas came to £2247; on distribution and management to £419; and other items made up a total of £2981—leaving £1088 to be added to the profit and loss account. The amount brought forward being £292, the total of this account is £1380. Interest and the half-year's dividends to Nov. 1, 1903, came to £382; leaving £998 for the final dividends. The Directors recommend these at the rate of 8 per cent. per annum on the ordinary and 5 per cent. per annum on the preference shares, both free of income-tax. This, with the interim dividends, will make 8 per cent. and 5 per cent. respectively for the year. Dividends at these rates will absorb £377; leaving a balance of £621, out of which the Directors recommend the payment of a bonus of 6s. per ordinary share to equalize to 8 per cent. the smaller dividends declared for the two years to May 1, 1890. The dividends upon these shares will then have averaged 8 per cent. since 1885. This will absorb a further £255; leaving £366 to be carried forward. In his report, the General Manager (Mr. George Anderson) congratulates the Directors and shareholders on having had a fairly satisfactory year. He says the works were maintained in a state of efficiency, and some slight structural alterations were made to enable them to cope with the extra business done; but further changes will be required if the present rate of growth should continue. The Company increased their sales of gas by about 5 per cent. as compared with the previous year. The carbonizing results were not so good as usual; but during this spring and summer the whole of the retorts are being renovated.

MIDDLETON CORPORATION GAS SUPPLY.

The Engineer's Report.

The Gas Engineer to the Middleton Corporation (Mr. E. E. J. Anderson) has presented to the Gas Committee his report on the working of the undertaking in the twelve months ending the 31st of March. It shows that there was in this period an outlay of £3160 on capital account—£1365 for new mains and services, and £1795 for meters. The gross revenue was £20,553, and the expenditure £14,876; leaving a gross profit of £5677, compared with £4904 in the year 1902-3. After deducting the sinking fund, &c., a loss of £570 is shown on the year's working, against £962 on that for the preceding twelve months. The quantity of gas manufactured exhibits only a slight decrease; but the gas sold was considerably less, and thatunaccounted for much greater—being 9·15 against 7·3 per cent. This is to a large extent due to the condition of tbe mains, into which Mr. Anderson found a number of wooden plugs driven, which had decayed with time, and caused loss of gas. Prepayment meters, however, accounted for an increase of nearly 5 million cubic feet of gas, and saved a more serious loss. The consumption in cottages, mills, &c., decreased about 9 million cubic feet; and lamps, stoves, engines, &c., had a rise of about 2 millions. In residuals, there was an increase of 240 tons in coke; making a total of nearly 1000 tons more available for sale than when Mr. Anderson took charge of the works. There were 68 tons more tar and 91 tons more liquor produced; while the sulphate of ammonia manufactured was 34 tons more. The total was much higher than had been obtained for several years, being 24¾ lbs. of salt per ton of coal carbonized; and though the price was practically the same as in 1902-3, there was an extra profit of £260. Mr. Anderson says that though there is an adverse balance of £570, which, of course, he is sorry to have to chronicle, the Committee have still the satisfaction of having the works and plant in good order; and if the cotton trade during the past year had given another 9 million cubic feet upon the gas manufacture, he would have been able to make a small profit, though not nearly enough to meet the adverse balance of £4000 of 1902. The working statement accompanying the report shows that the quantity of gas produced per ton of coal carbonized was 10,939 cubic feet, of which 9708 cubic feet were sold; the residuals per ton being: Coke, 10·83 cwt.; tar, 16·01 gallons; and liquor, 23·07 gallons. The capital employed is at the rate of £9 11s. 7d. per ton of coal, and 19s. 3d. per 1000 cubic feet of gas sold.

TUNBRIDGE WELLS ELECTRICITY WORKS.

Further Trading Proposals Defeated.

At their Monthly Meeting last Wednesday, the Tunbridge Wells Town Council further considered a proposal by the Electric Lighting Committee to apply for parliamentary powers to undertake free wiring and the supply of motors, &c., on the hire system.

The position of affairs was explained by the Mayor (Alderman Robb), who stated that the undertaking, in which about £80,000 was invested, had made great strides; the number of lamps supplied comparing favourably with other similar concerns. Then £2750 had been contributed to the rates, and there was a reserve fund of £3000. It might therefore be asked why the Committee were anxious to make any new move. The reason, however, was that last year it was found that, chiefly among the tradesmen of the town, they were losing a great many customers who were adopting incandescent gas lighting. This went on to such an extent that the Committee could not ignore it; and they instructed their Engineer to prepare a report, which showed that the undertaking had lost £800 of revenue by customers going back to gas. The Engineer therefore was of opinion that the future of the undertaking could only be assured by imitating the efficient competition of the Gas Company. Hence the wish to obtain the powers

SPIRAL GUIDED
GASHOLDERS
WITH WALKER'S IMPROVED METHOD OF STRONG PLATING
FOR ATTACHMENT OF GUIDES.

GASHOLDERS.
WITH GUIDE-FRAMING.
STEEL TANKS

FOR FULL PARTICULARS WRITE TO
C. & W. WALKER, Ltd.,

Midland Iron-Works:
DONNINGTON, NEWPORT, SALOP.

London Office:
110, CANNON STREET, E.C.

named. It was an anomaly that the Corporation should not possess the trading powers that a private company would have. A proposal to extend the area was dropped; but the Committee asked for an extension of their trading powers. The undertaking had reached a point at which it was difficult to say whether it would be carried on at a profit or at a loss. The net profit last year was £372; and considering the total capital and revenue involved, this was a really small profit, which would be extinguished by any unforeseen contingency. He admitted that the proposals were extreme municipal trading; and he should oppose them if they were initiating a new undertaking. But they were not doing so. The responsibility had been thrust upon them; and if they were going in for municipal trading at all, they must do so thoroughly. It was recognized by private companies that the best means of conducting their business was to supply their own lamps and fittings, and thus give customers more satisfaction. The success of the Gas Company was due to their undertaking the up-keep of gas-mantles, and seeing that their customers were satisfied. The provision of motors and radiators on the hire-purchase system would be a means of increasing the revenue, because private persons would not go to the initial outlay, whereas they would be willing to hire. This would lead to a demand for a supply in the day time. The Committee thought that if they were in a position to do this, they would build up their business; but if not, he saw no chance of increasing it. If they could not do as was suggested, and if they had any unforeseen expense, it might be necessary to increase the price 1d. per unit, which would be disastrous to the undertaking.

In the course of the subsequent discussion, Mr. Hicks remarked that the question before them was one purely of municipal trading; and he could not understand the argument that circumstances made it right to adopt a wrong principle. It had been a wise policy for the Council to set their face against municipal trading. If they had not done so, they might have been to-day like West Ham, offering a 3 per cent. loan at 84, and having it declined with thanks. Other members having spoken in the same strain, Alderman Penn said he did not see why the interests of half-a-dozen tradesmen stood in the way of the prosperity of the undertaking. It would not only benefit the consumers but the ratepayers generally to make the concern a success. The electric light as seen in many of the shops was bad; it was not so cheap as gas; and it was not so popular. The way to remedy this was to reduce the price and renew the lamps frequently.

Early in the proceedings, the Mayor asked the Town Clerk to read the opinion of Counsel, which he had asked him to take, as to the right of shareholders in the Gas Company to vote or speak on the matter before the Council. This opinion was to the effect that, although there was no actual decision, there was a consensus of opinion that gas shareholders could not speak or vote on a question in which they were pecuniarily interested; and the matter under consideration was held to come within these limits. This ruling, however, did not affect the result, as in the end the recommendation to apply for further powers was defeated by nine votes to thirteen.

LAMBETH WATER-WORKS COMPANY.

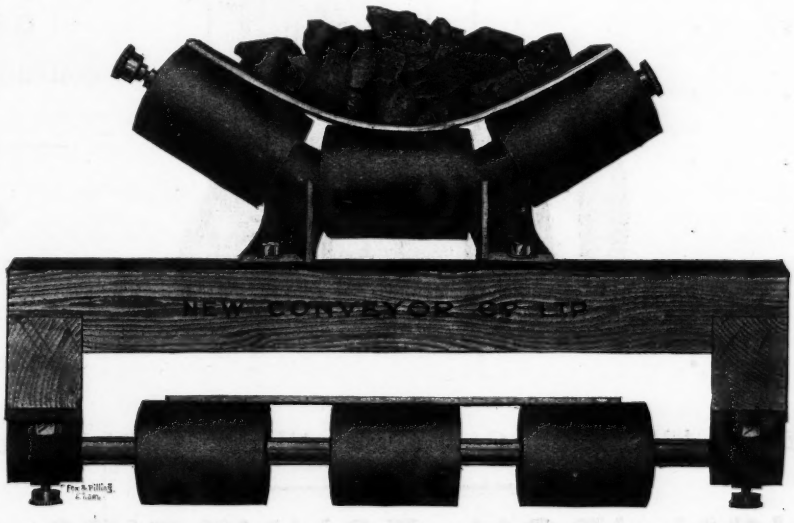
The Ordinary Half-Yearly General Meeting of this Company was held last Tuesday, at the Offices, Brixton Hill. The Right Hon. Viscount HAMPDEN, G.C.M.G., presided.

The SECETARY (Mr. H. Wilkins) having read the notice convening the meeting,

The CHAIRMAN moved—"That the report of the Directors now submitted be received, adopted, and entered on the minutes." He said that as the Company were now approaching the end of their career as a trading concern, the Directors had not thought it necessary to include in the report the usual statistical information. The accounts which the shareholders had in their hands were given in the usual form, and might be considered quite satisfactory. The expenditure was £296 less, and the balance applicable to dividend £2386 more, than for the same period of last year. The number of new supplies connected with the Company's works during the six months was 1691,—a very satisfactory result for a winter half year. The affairs of the Company at the close of their last complete half-year's trading might therefore be regarded as thoroughly sound. Turning to the second paragraph in the report, the shareholders would find that there was a net balance available for dividend of £84,003, notwithstanding an additional charge of £2393 for interest on debenture stock issued since March, 1903. The dividend recommended to the proprietors would absorb £74,672 10s.; and a sum of about £8000 would be payable to the Chamberlain of London under the sinking-fund clauses of the Company's Acts. As the transfer took place on the 24th inst., the next and final dividend would be paid for three months only; and as the audit would not be finished until the end of July, and as the month of August would be an inconvenient time for a general meeting and no question of principle was involved, the Directors asked for authority to distribute the amount divisible as profits for the current quarter on the principle hitherto adopted. Some delay in the payment of the final dividend was thus likely to be saved. With regard to the compensation awarded by the Court of Arbitration, the Directors had joined the Boards of other Companies in taking a case for final adjudication on the point whether the Company are to be compensated on the basis of having to contribute in perpetuity to the Chamberlain's sinking fund, which was ostensibly imposed as a temporary expedient. Should the appeal of the Company be successful, the compensation payable by the Water Board would be £288,000 more than if judgment was given against them. As the question was *sub iudice*, any observations on the incidence of the charge would be improper. The Directors would proceed with the preparation of a scheme for the distribution of the compensation as soon as the House of Lords had given their decision. There, again, he would suggest to the meeting that it was not desirable that they should discuss the question as to the interest and right of the different classes of shareholders, because it was certain that the decision of the House of Lords would affect those interests one way or the

BAND CONVEYORS

For RETORT-HOUSES, PURIFIER PLANTS, and COAL-STORES.



NEW CONVEYOR CO., LTD.,

SMETHWICK.

other. The Water Board need not pay the compensation until six months after the amount payable had been ascertained; but in the meantime, they would pay as interest from the 24th inst. an amount which the Directors had every reason to believe would be equal to the dividend now recommended. In default of agreement by both parties, the compensation for the transfer of the Company's undertaking was to be paid in cash. It was probable, however, that it would suit both the Water Board and the Company to come to an agreement for the discharge of the compensation in the form of water stock instead of cash. No proposal of the kind had yet been received from the Water Board with respect to the price of stock to be paid; but if the Directors were able at any time to make a provisional arrangement with the Board on the subject, they would immediately call the shareholders together to decide the question, because the proprietors must give the final decision The other clauses in the report were in the usual form. There was the question of the remuneration of the Directors and Auditors; and they left it with entire confidence in the hands of the shareholders. It was desirable that the retiring Directors should be re-elected in order to secure a continuity of policy of the Company.

Mr. G. E. N. RYAN seconded the motion, which was adopted.

The CHAIRMAN then moved—"That a dividend at the prescribed rate of 10 per cent. per annum on the £1,043,800 consolidated 10 per cent. stock, and a dividend at the prescribed rate of 7½ per cent. per annum on the £406,200 consolidated 7½ per cent. stock of the Company, together with a payment at the rate of 1 per cent. per annum on all the consolidated stock of the Company on account of deficiencies of previous dividends, be paid, less the income-tax."

Mr. F. E. MUNTZ seconded the motion, which was adopted.

The CHAIRMAN said that, with regard to the remarks he had made in reference to the payment of the next and final dividend, he moved—"That the certified profit available for immediate distribution after the 24th of June next, and legally distributable as such, be distributed after the Directors have retained such sum (if any) as they may consider necessary for the purposes of the Company as early as practicable after it has been received from the Water Board, in the following manner—that is to say, at the same rate on both descriptions of stock up to 7½ per cent. per annum, then up to 10 per cent. per annum on the consolidated 10 per cent. stock, and any surplus at the same rate per cent. on both descriptions of stock.

Mr. MUNTZ seconded the motion, which was adopted.

The CHAIRMAN said he mentioned also a question of remuneration of the Directors. The members of the Board would have to remain in office after the appointed day for the purpose of liquidating the Company. They proposed that the fees, instead of being at the rate of £3300, should be halved, and that their remuneration should be at the rate of £1650. He moved a resolution to this effect.

Mr. RYAN seconded the motion, which was adopted.

The CHAIRMAN next moved that the remuneration of the Auditors after June 24 be continued at the present rate; and this was agreed to.

The retiring Directors and Auditors were afterwards re-elected.

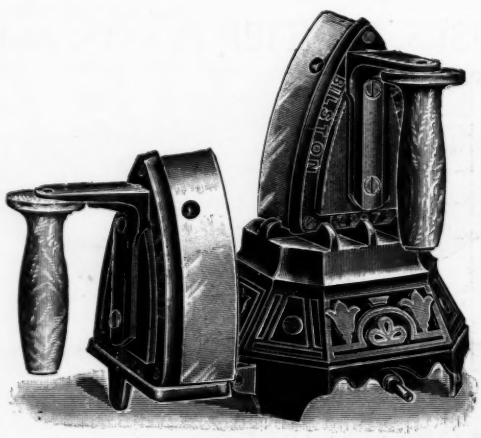
NEWPORT (MON.) CORPORATION WATER SUPPLY.

Completion of the Wentwood Scheme.

Last Tuesday, the Mayor of Newport (Mr. Clifford Phillips), in the presence of most of the members of the Corporation and a large number of the visitors, formally opened the Wentwood Water-Works, situated between Newport and Chepstow, which have been in course of construction for upwards of ten years, and have entailed an outlay of nearly £400,000. The company assembled at the Town Hall, and were driven to Wentwood, where a civic procession was formed, headed by the mace bearers, and proceeded along the embankment of the reservoir to the valve tower. Here the Town Clerk (Mr. A. A. Newman) read the certificate of Mr. Baldwin Latham, stating that the main portions of the works had been completed to his entire satisfaction. Alderman T. Goldsworthy, the Chairman of the Water Committee, then invited the Mayor to turn the water from the reservoir into the tower. He said the ceremony his Worship was about to perform was the most important which would fall to his lot during his year of office. By the completion of the works, one of the great needs of Newport had been supplied. The new works would more than double the water supply of the town, and would be sufficient to meet requirements for fifty years to come. The Mayor then turned the lever by which the water was admitted into the valve tower at the third sluice, there being at present nearly 100 million gallons of water in the reservoir, and the depth at the tower being 50 feet. The Mayor then manipulated another lever, and turned the water from the tower into the mains. The party subsequently moved to the centre of the main embankment, where Mr. Latham, who for several years has had the supervision of the works, presented the Mayor with a silver loving cup in commemoration of the event. The cup was filled with water from the reservoir, and all present took a draught. Mr. Charles Cullum, the Borough Treasurer, who was the Manager of the old Water Company, presented the Mayor with the "button" from the last joint in the pipe-line. It bore an inscription commemorative of the occasion, and was mounted and enclosed in a glass case. Mr. Latham remarked that the works, which had given great anxiety to the Corporation, were really most satisfactory, and the reservoir was perfectly water-tight.

In moving a vote of thanks to the Mayor, Alderman Goldsworthy said that no body of men could have worked together better than the Water Committee had done in order to bring the scheme to a successful issue. They had been faced with many difficulties, and had experienced much anxiety. The completion of the works had been delayed for two years by certain defects in the foundations. The foundations of the main embankment had been carried to a depth of 208 feet, and consisted of 113 feet of concrete and 95 feet of puddled clay. At first it was intended that the capacity of the reservoir should be 300 million gallons; but, owing to the strength of the embankment and the wing trenches which had been carried into the sides of the hills, it had been found practicable to increase it to 400 millions. The old water-

THE . .
"CANNON"
GAS . .
IRON . .
with . .
Stand . .
and . .
Trivet . .



The provision of domestic needs enhances GAS consumption.

A necessity amply provided.

JUST A LINE FOR GAS COMPANIES' SHOW-ROOMS.

CANNON IRON FOUNDRIES, LTD.,
DEEPFIELDS, near BILSTON, STAFFS.
London Office and Show-Room: BATH HOUSE, 57/60, HOLBORN VIADUCT, E.C.

works, which had a capacity of 261 million gallons, cost Newport £278,000; so that he thought the town had not done so badly in obtaining the new works at a cost of £380,000. The revenue from the supply of water when the Corporation took it over in 1888 was £13,000; but last year, notwithstanding the fact that they had made a reduction in the charges representing £1000 per annum, the income was £28,000. Mr. T. Parry, in seconding the motion, remarked that the new water supply would prove a great blessing and boon to Newport. The Mayor, in reply, congratulated the Water Committee and the inhabitants of Newport on the completion of the huge undertaking. They were indebted to Mr. Latham for the sterling ability he had put into the works; and to Mr. J. Macdonald, the Works Manager, for his services in connection with the scheme. The company subsequently inspected the works and reservoir, in which great interest was displayed.

The following are some particulars in regard to the scheme: The works occupy a site nine miles from Newport, in the direction of Chepstow, upon a part of what was formerly Wentwood Forest. The reservoir—practically a natural lake in the hollow of the hills—is situated at Llanvaches, in the valley between the Grey Hill and Mynydd Tir Fach. The work was first let out to contract. But it was not long before it was discovered that the undertaking, which it was thought might be carried out at a cost of just over £100,000, would prove of a far more expensive character, and might involve the Corporation and the Contractors in endless litigation or lengthy arbitration proceedings; for, owing to the strata, it was found impossible to secure foundation at anything like the depth anticipated. The Water Committee therefore terminated the contract, paying the Contractor £10,000 in settlement of all claims; and for nine years the undertaking has been carried out by direct labour, under the supervision of the Committee, acting according to the advice of Mr. Baldwin Latham. The difficulties were not at an end, however, for there was further trouble with the strata, and more than one expert suggested that the site should be abandoned. The embankment at the base is 536 feet wide, and gradually slopes; being at the top 30 feet wide. The main dam is 300 feet long, while the combined lengths of the wing trenches is 750 feet. The gathering ground is some 2½ miles away. The waters are collected at Newchurch, and will be brought into the reservoir by a brick-lined tunnel 2¼ miles long. At the lower end of the reservoir is the valve tower, connected with which are the mains to Newport, some nine miles distant. The mains were laid by direct labour for about £5000 less than the Engineer's estimate.

Reduction in Price.—The Stretford Gas Company are reducing the price of gas all round by 3d. per 1000 cubic feet from the 30th inst.; making the charge to ordinary consumers 2s. 6d. and for power purposes 2s. 3d. per 1000 cubic feet, with special rebates from these for large quantities.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Gas Committee of the Glasgow Corporation yesterday accepted tenders for the supply of coal for the gas-works for the coming year. The total quantity purchased is over 700,000 tons. First-class cannels have been bought at about last year's prices; and among them there is a lot of 20,000 tons from the Lothians. A parcel of 50,000 tons of Ayrshire second-class cannel has also been accepted. Fife shales have been bought in lots of from 10,000 to 20,000 tons, at a reduction of about 1s. per ton on last year's prices. Tenders for the usual Hamilton splints and ells have been accepted, in lots varying from 8000 to 10,000 tons, at reductions of from 3d. to 6d. per ton; and considerable quantities of main coal from the Cambuslang district have been taken at a similar reduction in price. Coking coal has also been purchased, in lots of from 15,000 to 30,000 tons, at from 3d. to 6d. per ton under the quotations of a year ago.

The discussion in the Edinburgh and Leith Gas Commission on Monday upon the policy of the Commissioners' dealing in gas-stoves and like appliances, given on another page, was interesting, not so much on account of what was said as of what was left unsaid. Bailie Douglas was making a pretty good case upon the argument that the policy had been adopted without much consideration by the Commissioners, but was stopped short just when he came to the point of getting in a shot at the quality of the gas. The exposure by Mr. Herring of certain leading citizens who complained of bad gas, and especially of Mr. Brown, the Treasurer of the City, still rankles in the breasts of those whose gas fittings were condemned. No opportunity has yet been found for reply to it; and I presume that what was intended was to give Mr. Brown's view of the matter. The explanation, if there be one, will have to be given another time.

Bailie Byron, the Convener of the Works Committee, reported that the Committee had that day accepted tenders for the portions of the carburetted water-gas plant which are required at Granton, at prices which amount to a little over £5000.

The "Scotsman" of yesterday contained the following statement: A few weeks ago, the residents in Trinity, to the number of over 300, representing nearly half-a-million sterling of property, sent a memorial to the Edinburgh and Leith Gas Commission in reference to the smell coming from the new gas-works at Granton. "It was," the memorial said, "very offensive, detrimental to the amenity of the district, and will seriously depreciate the value of property." They pointed out that in 1898, in connection with the Edinburgh and Leith Corporations Gas Bill, evidence was given before the Select Committee of the House of Lords, by Mr. Herring, who said: "They would have entirely new plant, so that they would be able to manufacture their gas under the most favourable conditions, and avoid nuisance to the surrounding property." Notwithstanding this, a nuisance, the memorialists say, has

COIN COLLECTING CONVEYANCES

Design No. 2. With body in position.

REDUCED PRICES.

No. 1 DESIGN (Fixed Body),
£7 10s. Net.

No. 2 DESIGN (Detachable Body)
£8 Net.

EXTRA STRONG WHEELS
28 inches diameter.

Painted and Lettered
to Instructions.

MILES PLATTING, MANCHESTER. SAWER & PURVES, GT. FREEMAN ST., NOTTINGHAM.

been created; and they asked the Commissioners to take immediate steps to put a stop to it. In reply to this memorial, a letter has now been received by the memorialists from Mr. Jack, the Clerk to the Gas Commissioners, in which he states: "The Engineer has been authorized to make certain experiments with the view of removing, as far as possible, any cause of complaint by the residenters of Trinity." It is understood that if the nuisance is not abated the memorialists intend to take the matter into Court. The communication has evidently been furnished, and by parties who wish to emphasize their threat.

In the Dundee Town Council on Thursday, Mr. Mitchell moved disapproval of a recommendation by the Gas Committee to take no action upon a petition that labourers in the gas-works should receive an increase of wages. The claim, which was made on behalf of the labourers by the Gas Workers and General Labourers' Union, was that all should receive 5½d. per hour. Mr. Stevenson, the Convener of the Gas Committee, moved approval of the recommendation. He was not aware, he said, that the labourers in the gas-works had made a single complaint about their wages. Bailie Nairn said the men had sent a letter to the Gas Committee stating that they had nothing to do with the letter from the agent of the Union, and that they desired no increase in wages. The matter was sent back to the Committee.

The accounts of the Dundee Corporation Gas Department for the year ending April 30 have just been issued. The revenue is stated to have been: From the sale of gas, £92,088, as compared with £102,653 in the preceding year, when the price was 6d. per 1000 cubic feet dearer; from the sale of residual products, £21,095, as compared with £18,765; and from the sale of coke there was an increased return of £2364. The total income from all sources was £114,170, as compared with £122,061. The expenditure was: For the manufacture of gas, £68,733, as compared with £71,996; for the distribution of gas, £10,316—an increase of £6044, of which £2513 was due to an increased charge for repairs and renewals, and £3530 to main and service pipe renewals and repairs. After making payments of £10,203 to the sinking fund, £7669 as interest, and £6316 for annuities, there remains a balance to be placed to this year's account of £936. The capital account showed the debt on the undertaking to be £390,097—a decrease of £36,329 during the year. The quantity of gas sold amounted to 697,580,000 cubic feet; and there were consumed on the works 6,830,000 cubic feet, and unaccounted for 54,058,650 cubic feet, or 7·749 per cent. The Committee recommend that the price of gas be reduced to ordinary consumers from 3s. to 2s. 10d. per 1000 cubic feet; to consumers through prepayment meters, 3s. 2d. per 1000 cubic feet; and for gas consumed in gas-engines, 2s. 7d.—a reduction of 2d. per 1000 cubic feet. The revenue from the sale of gas is estimated at £87,535, as compared with £92,088; and residual products are estimated to yield £16,278, and other sources £2550—making a total expected revenue of £106,363. On the expenditure side, it is estimated that the costs of manufacture will amount to £46,684; of purifying, repairs, and works charges, £16,155; of distribution, £6700; the annuities, interest, and sinking fund will amount to £24,521; rents, rates, and taxes to £7646; and the costs of management to £3395—making a total expenditure of £105,101, and leaving an anticipated surplus of £1198. The quantity of coal estimated for is 61,975 tons, which, at 9800 cubic feet per ton, will yield 605,589,000 cubic feet, and, with 100 million cubic feet of carburetted water gas, will raise the quantity to 705 million cubic feet, Benzol to the amount of 48,000 gallons is estimated for. The cost of production, for both coal and carburetted water gas, is estimated at 1s. 3·88d. per 1000 cubic feet. The Gas Committee considered the accounts and estimates on Monday. The greatest satisfaction was expressed that the year had turned out so well for the department, and that it had been found possible to reduce the price of gas by 2d. per 1000 cubic feet. Mr. Brownlee was of opinion that the price could have been reduced another penny if the Committee had not written off so much for depreciation; and he reserved his right to raise the subject again when the accounts are presented for approval.

After the doleful account which was published in last week's "Notes" regarding the position of the Broughty Ferry Corporation Gas Department, it is gratifying to read to-day—although the statement has no more authority than the previous one—that "It is satisfactory to learn that the outlook as regards Broughty Ferry gas affairs has brightened, and that, so far as the past year's working is concerned, the management claims to have held its own. It will be remembered that at the time of fixing the estimate the deficit was understood to be about £2200. A rise of 10d. (inclusive of 5d. put on in the previous year for a special purpose) was decided upon to meet this. Since that time, however, the deficit has grown very considerably, and may roughly be put at double the amount estimated for—leaving fully £2000 yet to clear off. If this were all, the continuance of last year's rise would meet the case; but, according to the suspense account arrangements for paying off the cost of alterations sanctioned a few months ago, provision had to be made in the estimates for the current year for the payment of one-tenth of the whole. There are other items that will go to swell the total; and if all the claims are fully faced this year, a rise will be necessary. The Council may follow the precedent of the past year, and leave a part of the burden till another year."

At a meeting of the Kilsyth Town Council on Monday, Colonel Frew, the Convener of the Gas Committee, gave an account of the income and expenditure of the Gas Department for the past year. The accounts showed a clear profit of £850. The Committee proposed to reduce the price of gas from 3s. 4d. to 2s. 11d. per 1000 cubic feet; and with what was left of the surplus, they intended to renew part of the gas-pipes. Five years ago, the Convener said, the price of gas was 4s. 2d. per 1000 cubic feet; and the make of gas was 16 million feet. Now it was 21 million cubic feet. Provost Wilson congratulated the Convener on his satisfactory report, and mentioned that since Colonel Frew was appointed Convener he had completely revolutionized the whole system of working, and was entitled to the thanks of the Council for his energy in this direction.

A Sub-Committee of the Perth Town Council have reported, with reference to the lighting of the streets, that they visited Glasgow on

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.)	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.
AND, IN ADDITION, 3,000,000 CUBIC FEET DAILY.

May 12, and that they received the fullest information there regarding the lighting of the streets by incandescent gas, and were furnished with copies of the report upon the subject which was recently presented to the Town Council of Glasgow. They now recommend the total abolition of all flat-flame gas-burners, and the adoption of a system of incandescent gas lighting in all streets in which gas is to be used. They are satisfied as to the unsuitability of incandescent electric lamps for street lighting. The estimated initial cost of the introduction of 215 incandescent gas-lamps is about £50, but some £30 a year will be saved by the discontinuance of twenty incandescent electric lamps. The accounts of the Gas Department for the past year have been so far made up as to disclose a large credit balance, which, it is stated, will enable a reduction to be made in the price of gas.

At the Kirkcudbright Town Council last week, it was reported that a letter had been received from the Glasgow and South-Western Railway Company asking whether any reduction could be made in the price of gas supplied to them, as they were considering the question of lighting by means of acetylene. A reply had been sent to the effect that the advisability of a general reduction in the price of gas was under consideration, and that as soon as a decision was come to the Company would be notified. The price is 6s. 8d. per 1000 cubic feet.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *June* 4.

Sulphate of Ammonia.

The market for prompt and near delivery remains quiet; and closing quotations are £11 15s. per ton f.o.b. Hull and Liverpool, and £11 16s. 3d. per ton f.o.b. Leith. There has been more inquiry; but buyers are not urgent, and meantime makers continue to market their output as it becomes available. There has also been more inquiry in the forward position; but the firmness of makers precludes much first-hand business. £11 17s. 6d. per ton is, however, reported to have been paid for July-December, and £12 per ton for October-March delivery.

Nitrate of Soda.

Steady at 10s. to 10s. 3d. per cwt., according to quality, on spot.

LONDON, *June* 3.

Tar Products.

The market remains in a depressed condition; and there has been very little business of importance done. Pitch is still quiet. In London the ruling price is about 32s. 6d.; while business is reported on the east coast at 32s., and there are rumours that 30s. was accepted for some quantity on the west coast. Business is reported to have been done over next year in the North of France at very low prices; but no confirmation of this has been received. Creosote remains firm. London makers still ask 1½d. to 1⅝d.; while in the North makers ask 1 7/16d. to 1½d. There is very little business doing in anthracene. Prices are nominally 1¾d. to 2d. for "A" quality, and 1d. for "B" quality; but there are no reports of business having been done. The demand for crude carbolic continues strong; but there is no business to report, as makers as a rule ask from 2s. 0½d. to 2s. 1d. up to the end of the year. Consumers, however, will not purchase further forward than September or October, and do not appear to be inclined to advance their price beyond 2s. In liquids, there are still second-hand parcels of foreign make offering at 8½d. to 9d. per gallon; but the Germans themselves ask 9½d., while English makers quote from 10d. to 1s., according to quality. Crystals remain in about the same position, although it is reported that one maker is willing to sell 39 to 40 per cent. in the North at a low price. Ninety per cent. benzol is quiet. Makers find it impossible to realize 9¼d., and have again dropped their price to 9d. —without, however, finding buyers. Fifty to ninety per cent. is still neglected. There is no business to report in solvent. Prices are nominally from 6½d. to 8d., according to quality. In toluol there still appears to be no business whatever doing. No transactions of any magnitude are reported in tar.

The average values during the week were: Tar, 17s. 6d. to 22s. 6d. Pitch, London, 32s. to 32s. 6d.; east coast, 32s.; west coast, 30s. 6d. to 31s. Benzol, 90 per cent., 9d.; 50-90 per cent., 7d. Toluol, 6½d. Crude naphtha, 3d.; solvent naphtha, 6½d. to 8d.; heavy naphtha, 10d. to 10½d. Creosote, London, 1½d. to 1⅝d.; North, 1⅜d. Heavy oils, 2⅛d. to 2¼d. Carbolic acid, 60 per cent., 2s. Refined naphthalene, £5 to £8; salts, 22s. 6d. to 25s. Anthracene, "A" quality, 1¾d. to 2d.; "B" quality, 1d., nominal.

Sulphate of Ammonia.

The market has been very quiet during the week, but closes rather firmer. The Gaslight and Coke Company still ask £11 17s. 6d., but do not report having done any business. Sales of London make are reported at £11 15s.; and the value may be taken as from £11 15s. to £11 16s. 3d. Hull is very quiet at £11 12s. 6d. to £11 15s. Small sales are reported in Liverpool at £11 15s., and the value may be taken at from this price to £11 16s. 3d. Business in Leith is reported both at £11 16s. 3d. and £11 17s. 6d.; and the market is now £11 16s. 3d. to £11 18s. 9d., while most of the large manufacturers ask £12.

Sales of Shares.—At Oswestry recently, Mr. C. E. Williams sold 16 fully-paid £10 shares in the Oswestry Gas Company at £21 5s. and £21 10s. each. At the Auction Mart, Canterbury, Mr. Frank Amos lately sold £2500 of new "A" and "B" stocks of the Canterbury Gas and Water Company, in £10 lots, at an average price of £18 8s. per lot. Messrs. John Margetts and Sons sold, a few days ago, three fully-paid £50 shares in the Warwick Gas Company at par. At Grimsby, recently, £10,000 of new ordinary stock of the Cleethorpes Gas Company, carrying 6½ per cent. dividend, was sold at prices ranging from £128 to £135 per £100 of stock. Last Tuesday, £368 of original stock in the Leighton Buzzard Gas Company was offered for sale by auction in £20 lots, which fetched £48 each.

THE

MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

PREVENTS NAPHTHALENE DEPOSITS.

OVER 120 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies and Towns supplied are The Gaslight and Coke Company, The South Metropolitan Gas Company, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Oldham, Dundee, Perth, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past Ten Years.

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Except that collieries have got rid of surplus under load on the sidings, and here and there have filled up moderate quantities of engine fuel out of stock, the protracted stoppages for the Whitsuntide holidays have not placed the coal trade in any appreciably better position. For all descriptions of fuel the demand remains extremely slow, especially in the better qualities suitable for house-fire consumption and the common round coals used for steam and forge purposes. The present demand is not sufficient to keep the pits running more than about half time; and for the next two or three months there is certain to be a general and extensive restriction of output to prevent accumulation of further heavy stocks. With regard to gas coals, although there is a generally expressed determination not to give way more than about 3d. on last year, where important contracts come forward for settlement, the basis is more nearly 6d.; and it is reported that the Liverpool gas-coal contracts have been concluded at a reduction of 6d. per ton on 1903 prices. So far, average quotations would seem to be about 8s. to 8s. 3d. and 8s. 6d. per ton for good screened Wigan gas coal, and 8s. 9d. to 9s. 3d. and 9s. 6d. for screened Wigan Arley. There are, of course, inferior descriptions of gas coal, which are quoted at under these figures. The London and North-Western Company have now settled their contracts for locomotive fuel in the Lancashire district at 7s. 6d. per ton at the pit, which is 3d. under the price they had to pay last year. With regard to the general run of trade, house-fire qualities are without quoted alteration; but concessions on current rates are frequently made to effect special sales. Quotations remain about 13s. to 14s. per ton at the pit for best Wigan Arley, 11s. to 12s. for seconds Arley and Pemberton four-feet, and from 8s. 6d. and 9s. to 10s. for common house fire coals. Steam and forge descriptions are cut very much to effect sales, and can be bought from as low as 7s. 6d. and 7s. 9d. per ton at the pit, with better qualities quoted 8s. 3d. to 8s. 6d. For shipment, there is also very low cutting to secure cargoes; and ordinary steam coals for delivery at the ports on the Mersey or the Manchester Ship Canal are readily obtainable at 9s. to 9s. 3d., with special quotations in some cases at 8s. 9d. Engine fuel is perhaps not quite so plentiful as of late, particularly in the better qualities. Common Lancashire slack ranges from 3s. 9d. to 4s. and 4s. 6d., medium sorts 5s. to 5s. 6d., and best qualities 6s. to 6s. 6d. per ton.

Northern Coal Trade.

There is a steady demand for coals, and the shipments are good for this season; but this is a time of the year when the supply of Durham coals especially is ample for all the requirements. In steam coals, best Northumbrians are quoted from 10s. 3d. to 10s. 6d. per ton f.o.b.; and the collieries are well employed generally. Second-class steams are from 8s. 9d. to 9s. per ton f.o.b.; and steam smalls are from 4s. 6d. to 5s.—the latter class being now plentiful. In gas coals, there are now moderate deliveries on the large home contracts; so that the collieries have an occasional idle day. Durham gas coals vary from about 7s. 9d. to 8s. 3d. per ton f.o.b.; the best kinds being relatively the most in demand, though some of the collieries that have good export contracts seem to be now shipping somewhat freely, and are fairly active in work. No heavy contracts are reported of late; but a large supply for the South of France is in treaty. The coke trade is quieter; but gas coke is rather scarce through the limited output, and the price quoted varies from 13s. to 13s. 6d. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

There is no change to report during the week. The demand continues barely sufficient to meet the output of the collieries. Prices seem to be tending downwards, as is evidenced by the fixing of the Glasgow Corporation gas contracts for the year at a reduction. The coalmasters, too, have given notice to the representatives of the men that they are to propose a reduction of wages below the 5s. 6d., which is the minimum under the regulations of the Conciliation Board. The prices quoted are: Main 7s. 3d. to 7s. 6d. per ton f.o.b. Glasgow, ell 8s. to 9s. 3d., and splint 8s. 3d. to 8s. 6d. The shipments for the week amounted to 243,851 tons—an increase of 11,429 tons upon the previous week, but a decrease of 3622 tons upon the corresponding week of last year. For the year to date, the total shipments have been 4,322,969 tons—an increase of 110,628 tons upon the same period of 1903.

The Stamping of Electricity Meters.—At a meeting of the Leeds Chamber of Commerce last Tuesday, Mr. W. D. Helps, of Messrs. James Milne and Son, Limited, moved a resolution to the effect that meters for the measurement of electricity should, like those used for gas, be stamped and authorized by the Board of Trade. He pointed out that at present there is no such provision, and that meters for the measurement of electricity can be removed from one place to another and used without requiring to be stamped as a guarantee of their correctness. He said he wished the motion to be a recommendation to the Board of Trade. The resolution was agreed to.

Public Lighting of Plymouth.—In his annual report, Mr. E. G. Okell, the Electrical Engineer to the Plymouth Corporation, refers briefly to the public lighting which is under his general superintendence. With regard to the electric arc lamps, it is stated that the consumption of current has been 2550 units in excess of the previous year. There were 84 additional gas-lamps fixed, mainly in new districts and back lanes; making the total 2353. Repairs of lanterns—the whole of which were newly fixed a few years ago on the adoption of incandescent lighting—are now gradually increasing; and this year the repair staff has been fully occupied with this work, and unable to make any new lanterns. A man is now employed specially to test and adjust governors and burners, so as to ensure that there is the full and correct consumption of gas, and that the best results are obtained. The consumption of mantles has been at the rate of 6·23 per lamp per annum—roughly, two months' life for each mantle.

Now Ready, pp. 584 & XVI. 251 Illustrations. F'cap. Quarto, Price 18s. net (Post Free),

THE SEVENTH EDITION OF

NEWBIGGING'S HANDBOOK

FOR

GAS ENGINEERS & MANAGERS.

(DEDICATED TO SIR GEORGE LIVESEY.)

The Work has been revised throughout, and contains 40 pages of Letterpress and 12 Illustrations more than the last Edition.

In almost every department additions have been made; and it is believed that the labour bestowed on its production will enhance the value of the book as a Work of Reference.

Orders may be sent through any Bookseller, or direct to the Publisher,

WALTER KING, Office of the "Journal of Gas Lighting," &c.,

11, BOLT COURT, FLEET STREET, LONDON.

Drakes Limited have recently obtained orders for their patent tube regenerator furnaces from Denbigh, Glastonbury, Selby, and Walton-on-the-Naze.

Messrs. A. E. Podmore and Co., late of 25a, Hatton Garden, have removed to larger premises, and their address now is: No. 33, Charles Street, Hatton Garden.

The Directors of the European Gas Company, Limited, have decided to recommend to the shareholders the payment of the usual final dividend of 6 per cent., *plus* 1 per cent. bonus.

The St. Pancras and Chelsea Borough Councils have approved and adopted Messrs. W. Sugg and Co.'s patent "Windsor" lamps and burners for the lighting of their districts with incandescent gas, and the firm are now carrying out the work for them.

Mr. A. Witham, who has been connected with the London branch of Messrs. James Milne and Son, Limited, for upwards of sixteen years, has resigned his appointment, and will in future represent Messrs. J. & W. B. Smith, of Farringdon Road, E C, in the South and West of England.

The Empire Intensified Gaslight Company, Limited, of Victoria Street, S.W. (who are the owners of the Somzée-Greyson patents), have received an intimation that, after a very severe competitive test by the Galashiels Corporation, their burner has been adopted for the complete lighting of the town.

At the meeting of the Skipton District Council on Thursday, a resolution passed at the last meeting of the former Council, in April, to increase the salary of the Gas Manager (Mr. J. Woodward) by £50 per annum, was reconsidered, and it was decided, by a majority of one, to make the advance £25 only.

The Directors of the Continental Union Gas Company, Limited, have decided to pay an interim dividend of 3 per cent., free of tax, on the ordinary stock, for the past six months (being at the rate of 6 per cent. per annum), together with the half-yearly dividend of 3½ per cent. on the preference stock, the latter less income-tax.

By an annoucement which appears elsewhere, it will be seen that Mr. J. W. Crosby will conduct next Tuesday a sale of new ordinary stock (maximum dividend 5 per cent.), of the nominal value of £10,000, of the Hartlepool Gas and Water Company. It is required for the outlay on the new reservoir at Crookfort and additional pumping plant.

The Belfast Corporation have granted Mr. John Ellis, late a collector in the Gas Department, who had been in the service of the Council since 1874, when they took over the gas-works, and whose salary at the time of his retirement was £250 per annum, a pension of £80 a year, he having resigned owing to physical infirmity of mind and body.

Experiments by the Engineer of the St. Albans Gas-Works have resulted in the adoption of Edgar's system of low-pressure induced current self-intensifying lighting. The lantern is erected in the most exposed position in the town—viz., on the hill top—and the efficiency of the system has given great satisfaction. The consumption of the lantern is 17 feet an hour, and the illuminating power 600 candles.

Mr. F. A. Winstanley, the Gas Engineer to the Rotherham Corporation, has had his salary increased from £300 to £350 a year. When the matter was under discussion by the Council, one of the members remarked that if there was a servant of the Corporation who deserved recognition it was Mr. Winstanley, for he had had a good deal to battle with in the management of the gas-works that other managers had not to contend with.

The City of London Corporation are evidently determined to install the incandescent system of gas lighting wherever possible. We notice that they have now removed the electric standard and lamp which previously stood over the convenience at Liverpool Street; and in its place the James Keith and Blackman Company are erecting one of their 2000-candle power high-pressure lamps. The compressor for supplying gas to the lamp is driven by water, and is placed below, in the convenience. The exhaust water is used for flushing purposes.

An exhibition of gas cooking-stoves, supplied by Messrs. R. & A. Main, Limited, was opened, under the auspices of the Ramsbottom Gas Company, in St. Anne's Church Schools, Tottington, last Tuesday. The Welsbach Incandescent Gas-Light Company had a stall; and Messrs. Glover and Co., Limited, showed a penny-in-the-slot meter by which the visitors were enabled to see the internal arrangements. The opening ceremony was performed by Mr. F. Barrett, the Manager of the Ramsbottom Gas Company, who emphasized the value of gas for culinary purposes, and pointed out that the Company let stoves at very low rental, and that they had reduced the price of gas 2d. per 1000 cubic feet. Cookery lectures were given by Mrs. Gray.

Last Tuesday, an exhibition of gas appliances was opened in the Music Hall, Chester, under the auspices of the Chester United Gas Company, and will be continued till next Friday. Various kinds of stoves have been furnished by Messrs. Fletcher, Russell, and Co., Limited, Messrs. Wilsons and Mathiesons, Limited, and John Wright and Eagle Range, Limited; while the Gas Company have a capital display of the latest improvements in gas lighting appliances, especially on the incandescent system. Cookery lectures and demonstrations are given twice daily by Miss Atkinson. A novel feature of the exhibition is a cooking competition for scholars attending elementary schools.

Messrs. William Sugg and Co. have just supplied and fixed for the lighting of Worthing Pier, fifty of their "South London" pattern lamps on special cast-iron bases; each lamp being fitted with one of their patent anti-vibrating incandescent burners, giving a light equal to 120 candles. A special feature of the lamp is that the half which faces the water is divided into two sections, and glazed with coloured glass; while the other half is glazed with one pane of clear glass. The pier is beautifully lighted with a white light; while the coloured glass gives a very pretty effect from the water side. The lamps are made of copper throughout, and specially strengthened to withstand the gales so often experienced at Worthing. They are, therefore, wind and rain proof; and being fixed on solid bases and anti-vibrator burners, the mantles stand perfectly in the roughest weather.

The "MAIN"

Gas Cooker

WITH LATEST DEVELOPMENTS.

SPECIAL FEATURES.

OUR NEW PATENT ENAMEL is guaranteed free from Lead or other Poisonous Chemicals.

Inside Fittings, Porcelain Enamelled.

Can be supplied with Moveable Burners, if desired.

ORDERS DESPATCHED SAME DAY AS RECEIVED.

R. & A. MAIN, LTD.,

LONDON: 49, Queen Victoria Street. | GLASGOW: 26, West Nile Street. | FALKIRK: Gothic Works.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

CHIEF ENGINEER. Metropolitan Water Board. Applications by June 10.
MANAGER. Gosport Gas Company. Applications by June 15.
MANAGER. Montrose Gas-Works.
DRAUGHTSMAN. C. & W. Walker, Donnington.
REPRESENTATIVE. "Refractory," care of Streets, Cornhill.

Plant, &c., for Sale.

CONDENSER (250,000 feet). Redditch Gas-Works.
PURIFIERS. Neston Gas-Works.

Plant, &c., Wanted.

CONDENSER. No. 4219.
TOWER SCRUBBER. No. 4203.

Stocks and Shares for Sale.

ALDERSHOT GAS AND WATER COMPANY. June 21.
ASCOT GAS COMPANY. June 21.
BARKING GAS COMPANY. June 21.
EAST SURREY WATER COMPANY. June 22.
HARTLEPOOL GAS AND WATER COMPANY. June 29.
MAIDENHEAD GAS COMPANY. June 21.
REIGATE GAS COMPANY. June 22.
SOUTHWARK AND VAUXHALL WATER COMPANY. June 10.

TENDERS FOR

Benzol.

LEIGH CORPORATION. Tenders by June 11.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.

Brass Main Cocks.

MIDDLETON GAS DEPARTMENT. Tenders by June 8.

Coal and Cannel.

BAKEWELL GAS DEPARTMENT. Tenders by June 30.
BANGOR GAS DEPARTMENT. Tenders by June 20.
BELPER GAS COMPANY. Tenders by June 11.
BRIDGNORTH GAS DEPARTMENT. Tenders by June 16.
BURY GAS DEPARTMENT. Tenders by June 18.
BUXTON GAS DEPARTMENT. Tenders by June 13.
CARNARVON GAS DEPARTMENT. Tenders by June 23.
ETON GAS COMPANY. Tenders by June 18.
GAINSBOROUGH GAS DEPARTMENT. Tenders by June 23.
HARLOW AND SAWBRIDGEWORTH GAS COMPANY. Tenders by June 24.
HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD. Tenders by June 8.
HEREFORD GAS DEPARTMENT. Tenders by June 25.
HEXHAM GAS COMPANY. Tenders by June 13.

Tenders for—*Coal and Cannel continued.*

HEYWOOD GAS DEPARTMENT. Tenders by June 14.
HONLEY GAS DEPARTMENT. Tenders by June 22.
KESWICK GAS COMPANY. Tenders by June 22.
LANCASTER GAS DEPARTMENT. Tenders by June 15.
LEAMINGTON PRIORS GAS COMPANY. Tenders by June 21.
LEIGH CORPORATION. Tenders by June 11.
LINCOLN GAS DEPARTMENT. Tenders by June 18.
LYMM GAS DEPARTMENT. Tenders by June 22.
MANCHESTER GAS DEPARTMENT. Tenders by June 22.
MARKET HARBOROUGH GAS DEPARTMENT. Tenders by June 24.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.
NEWBURY GAS DEPARTMENT. Tenders by June 6.
NEW MILLS GAS DEPARTMENT. Tenders by June 14.
NOTTINGHAM WATER DEPARTMENT. Tenders by June 25. (Samples by June 15).
OLDHAM GAS COMPANY. Tenders by June 14.
RHONDDA CORPORATION. Tenders by June 16.
ROTHERHAM GAS DEPARTMENT. Tenders by June 20.
SEDGLEY GAS DEPARTMENT. Tenders by June 9.
SHREWSBURY GAS COMPANY. Tenders by June 18.
SMETHWICK GAS DEPARTMENT. Tenders by June 23.
STOKE-ON-TRENT GAS DEPARTMENT. Tenders by June 15.
STOURBRIDGE GAS DEPARTMENT. Tenders by June 14.
STRETFORD GAS COMPANY. Tenders by June 14.
TAUNTON GAS COMPANY. Tenders by June 10.
TENTERDEN GAS COMPANY. Tenders by June 17.
WARRINGTON GAS DEPARTMENT. Tenders by June 16.
WIRKSWORTH GAS COMPANY. Tenders by June 25.
WOKINGHAM GAS DEPARTMENT. Tenders by June 14.
WORKSOP GAS COMPANY. Tenders by June 13.

Engine and Exhauster and Alterations.

BUXTON GAS DEPARTMENT. Tenders by June 13.

Furnace Slag, Fettling, and Mill Scale.

GREAT WESTERN RAILWAY. Tenders by June 28.

Gasholder and Steel Tank.

NEWBURY GAS DEPARTMENT. Tenders by June 20.

Lead and Lead Piping.

LEIGH CORPORATION. Tenders by June 11.
NOTTINGHAM WATER DEPARTMENT. Tenders by June 25.

Lime.

CONGLETON GAS DEPARTMENT. Tenders by June 11.
KEIGHLEY GAS DEPARTMENT. Tenders by June 20.
LEIGH CORPORATION. Tenders by June 11.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.

Meters.

MIDDLETON GAS DEPARTMENT. Tenders by June 8.

Oils and Lubricants.

MIDDLETON GAS DEPARTMENT. Tenders by June 8.

Oxide (Spent).

KEIGHLEY GAS DEPARTMENT. Tenders by June 20.

Pipes and Specials.

LEIGH CORPORATION. Tenders by June 11.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.
NOTTINGHAM WATER DEPARTMENT. Tenders by June 25.
RHONDDA CORPORATION. Tenders by June 16.

Purifiers.

MASTERTON (N.Z.) GAS DEPARTMENT.

Sulphuric Acid.

KEIGHLEY GAS DEPARTMENT. Tenders by June 20.
LEIGH CORPORATION. Tenders by June 11.
MARKET HARBOROUGH GAS DEPARTMENT. Tenders by June 24.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.

Tar and Ammoniacal Liquor.

BAKEWELL GAS DEPARTMENT. Tenders by June 30.
BRIERLEY HILL GASLIGHT COMPANY. Tenders by June 24.
BUXTON GAS DEPARTMENT. Tenders by June 13.
CARNARVON GAS DEPARTMENT. Tenders by June 23.
CONGLETON GAS DEPARTMENT. Tenders by June 11.
GREAT WESTERN RAILWAY. Tenders by June 28.
HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD. Tenders by June 8.
HONLEY GAS DEPARTMENT. Tenders by June 22.
KESWICK GAS COMPANY. Tenders by June 22.
LYMM GAS DEPARTMENT. Tenders by June 22.
MIDDLETON GAS DEPARTMENT. Tenders by June 8.
NEW MILLS GAS DEPARTMENT. Tenders by June 14.
READING GAS COMPANY. Tenders by June 20.
STOURBRIDGE GAS DEPARTMENT. Tenders by June 14.
STRETFORD GAS COMPANY. Tenders by June 14.
WIRKSWORTH GAS COMPANY. Tenders by June 25.

Valves, Hydrants, Taps, &c.

NOTTINGHAM WATER DEPARTMENT. Tenders by June 25.

Ventilators.

BUXTON GAS DEPARTMENT. Tenders by June 13.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 639.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 14	10½	**Alliance & Dublin 10 p.c.**	20–21	..	5 0 0
100,000	10	,,	7	**Do. 7 p.c.**	13–14	..	5 7 2
200,000	5	May 12	6½	**Bombay, Ltd.**	6–6½	..	5 4 0
140,000	5	,,	6½	**Do. New, £4 paid**	4⅞–5¼	..	4 18 11
380,000	Stk.	Feb. 25	12	**Brentford Consolidated**	242–247	..	4 17 2
300,030	,,	,,	9	**Do. New**	182–187	..	4 16 3
50,000	,,	,,	5	**Do. 5 p.c. Pref.**	127–132	..	3 15 9
206,250	,,	Dec. 11	4	**Do. 4 p.c. Deb.**	103–108	..	3 14 1
220,000	Stk.	Mar. 10	10½	**Brighton & Hove Orig.**	212–217	..	4 19 1
246,320	,,	,,	7½	**Do. A. Ord. Stk.**	150–155	..	5 0 0
460,000	20	Apl. 14	10	**British**	38½–39¼	..	5 1 3
100,000	Stk.	Feb. 25	6	**Bromley, Ord. 5 p.c.**	114–118	..	5 1 8
165,700	,,	,,	4½	**Do. do. 3½ p.c.**	87–92	..	4 17 10
500,000	10	May 12	7	**Buenos Ayres (New) Ltd**	10¾–11¼	..	6 4 5
250,000	Stk.	Dec. 30	4	**Do. 4 p.c. Deb.**	94–96	+1	4 3 4
150,000	20	Mar. 10	8½	**Cagliari, Ltd.**	21–23	..	7 3 6
100,000	10	May 27	10	**Cape Town & Dis., Ltd.**	14–15*	..	6 13 4
50,000	50	May 3	6	**Do. 6 p.c. 1st Mort.**	51–53	..	5 13 2
1,375,000	Stk.	Feb. 25	5⅛	**Commercial 4 p.c. Stk.**	112–114	+4	4 11 3
536,485	,,	,,	5	**Do. 3½ p.c. do.**	106–109	+3	4 11 9
442,947	,,	Dec. 11	3	**Do. 3 p.c. Deb. do.**	85–88	..	3 8 2
800,000	Stk.	Dec. 30	7	**Continental Union, Ltd.**	115–120	..	5 16 8
200,000	,,	,,	7	**Do. 7 p.c. Pref.**	140–145	..	4 16 7
575,000	Stk.	Feb. 25	5⅛	**Crystal Palace Ord. 5 p.c.**	118–123	..	4 6 8
60,000	,,	,,	5	**Do. 5 p.c. Pref.**	120–125	..	4 0 0
112,533	,,	Jan. 14	5	**Do. 5 p.c. Deb. Stk.**	135–138	..	3 11 6
486,090	10	Jan. 28	11†	**European, Ltd.**	18½–19¼	..	5 12 10
354,060	10	,,	11†	**Do. £7 10s. paid**	13⅜–14⅛	..	5 13 10
15,243,200	Stk.	Feb. 11	4⅛	**Gas-light and Coke** { 4 p.c. Ord. / 3½ p.c. max. / 4 p.c. Con. Pref. / 3 p.c. Con. Deb.	94–96 / 89–91 / 108–111 / 87–89	..	4 11 8 / 3 16 11 / 3 12 1 / 3 7 5
2,600,000	,,	,,	3½				
3,799,735	,,	,,	4				
4,193,975	,,	Dec. 11	3				
258,740	Stk.	Mar. 10	5	**Hastings & St. L. 3½ p.c.**	90–95	..	5 5 3
70,000	10	Apl. 28	11	**Hongkong & China, Ltd.**	15–16	..	6 17 6
3,800,000	Stk.	May 12	10	**Imperial Continental**	202–205	..	4 17 7
473,600	Stk.	Feb. 11	3½	**Do. 3½ p.c. Deb. Red.**	97–99	..	3 10 8
165,242	Stk.	Mar. 10	6	**Lea Bridge Ord. 5 p.c.**	113–118	..	5 1 8
561,000	Stk.	Feb. 25	10	**Liverpool United A**	215–216	..	4 12 7
718,100	,,	,,	7	**Do. do. B**	159–161	..	4 6 11
306,083	,,	Dec. 30	4	**Do. do. Deb. Stk.**	108–110	..	3 12 9
75,000	5	Dec. 11	5	**Malta & Medn., Ltd.**	4¼–4⅜	..	5 5 3
560,000	100	Apl. 5	5	**Met. of 5 p.c. Deb.**	100–103	..	4 17 1
250,000	100	,,	4½	**Melbourne 4½ p.c. Deb.**	101–102	..	4 8 3
541,920	20	May 27	3½	**Monte Video, Ltd.**	9–10*	..	7 0 0
1,515,892	Stk.	Feb. 26	4½	**Newc'tle & G'tesh'd Con.**	103¼–104⅛	+⅛	4 6 2
406,025	Stk.	Dec. 31	3½	**Do. 3½ p.c. Deb.**	93¾–94⅜	..	3 14 1
300,000	Stk.	May 12	8	**Oriental, Ltd.**	135–140	..	5 14 4
600,000	5	Mar. 29	7	**Ottoman, Ltd.**	5⅜–6⅝	..	5 12 0

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
205,005	Stk.	Jan. 14	6½	**Ply'mth & St'house 5 p.c**	121–126	..	4 17 2
851,070	10	Apl. 28	7	**River Plate Ord.**	10¾–11¼	−¼	6 4 5
300,000	Stk.	Dec. 30	4	**Do. 4 p.c. Deb.**	93–97	..	4 2 5
350,000	10	Mar. 29	7	**San Paulo, Ltd.**	11–12	..	5 16 8
135,000	Stk.	Mar. 10	10	**Sheffield A**	237–239	..	4 3 8
209,984	,,	,,	10	**Do. B**	236–238	+1	4 4 0
523,498	,,	,,	10	**Do. C**	235–237	+1	4 4 5
116,106	Stk.	Mar. 29	5	**Shrewsbury Ord. 5 p.c.**	107–110	..	4 10 11
6,150,000	Stk.	Feb. 11	5⅛	**South Met., 4 p.c. Ord.**	126–128	+1	4 3 3
1,832,700	,,	Jan. 14	3	**Do. 3 p.c. Deb.**	87–89	..	3 7 5
380,940	Stk.	May 12	5	**Southampton Ord.**	105–110	..	4 10 11
87,950	,,	Jan. 14	4	**Do. 4 p.c. Deb.**	100–103	..	3 17 8
120,000	Stk.	Feb. 25	6	**Tottenham and Edmonton** { A. 5 p.c. / B. 3½ p.c.	120–125 / 97–102	.. / ..	4 16 0 / 4 8 3
313,020	,,	,,	4½				
132,380	10	Dec. 30	8	**Tuscan, Ltd.**	8⅛–9	..	8 17 10
149,000	10	Jan. 2	5	**Do. 5 p.c. Deb. Red.**	97–99	..	5 1 0
745,872	Stk.	Mar. 10	5	**West Ham, 5 p.c. Ord.**	97–102	..	4 18 0
				WATER COMPANIES.			
781,517	Stk.	Dec. 30	12	**Chelsea, Ord.**	360–365	+2	3 5 9
150,000	,,	,,	5	**Do. 5 p.c. Pref.**	147–152	+5	3 5 9
160,000	,,	,,	4½	**Do. 4½ p.c. Pref. '75**	137–142	+5	3 3 5
175,785	,,	Mar. 29	4½	**Do. 4½ p.c. Deb.**	132–137	..	3 5 8
1,720,560	Stk.	Mar. 29	8	**East London, Ord.**	220–225	..	3 11 1
654,740	,,	Dec. 11	4½	**Do. 4½ p.c. Deb.**	134–139	..	3 4 9
1,524,288	,,	,,	3	**Do. 3 p.c. Deb.**	89–92	..	3 5 2
150,000	,,	,,	12†	**Grand Junction** { 10 p.c. max. / 4 p.c. Deb.	138–142 / 115–120	+1½ / ..	4 4 6 / 3 6 8
700,000	50	,,					
310,000	Stk.	Mar. 29	4				
708,000	Stk.	Feb. 25	10	**Kent**	318–323	..	3 2 4
160,000	,,	,,	7	**Do. New, 7 p.c. max.**	220–225	..	3 2 3
1,043,800	100	Dec. 30	11	**Lambeth, 10 p.c. max.**	317–322	+2	3 8 4
436,200	100	,,	8½	**Do. 7½ p.c. max.**	223–233	..	3 13 0
350,000	Stk.	Mar. 29	4	**Do. 4 p.c. Deb.**	115–120	..	3 6 8
500,000	100	Feb. 25	10	**New River, New Shares**	365–375	+5	2 13 4
1,000,000	Stk.	Jan. 28	4	**Do. 4 p.c. Deb.**	118–121	..	3 6 2
902,300	Stk.	Dec. 30	7½	**Southwark and Vauxhall** { Ord. / 7½ p.c. max. / 5 p.c. Pref. / 4 p.c. A Deb.	277–282 / 215–225 / 144–149 / 115–120	+2 / .. / .. / ..	2 13 2 / 3 6 8 / 3 7 1 / 3 6 8
126,500	100	,,	7½				
489,200	Stk.	,,	5				
1,019,585	,,	Mar. 29	4				
1,155,066	Stk.	May 27	10	**West Middlesex**	295–300*	..	3 6 8
200,000	,,	,,	4½	**Do. 4½ p.c. Deb.**	132–137	..	3 5 8
200,000	,,	Mar. 10	3	**Do. 3 p.c. Deb.**	89–92	..	3 5 2

* Ex div.

† Next dividend will be at this rate.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."
United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in Advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in Advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.

JOHN WM. O'NEILL, Managing Director,

PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London E.C. "Volcanism, London."

SPENT OXIDE.

THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

TO GAS AND WATER OFFICIALS.

MELROSE CYCLES and Slot Copper COLLECTORS. Latest Design and lowest Prices. For Cash or gradual payments. Catalogue free.
MELROSE CYCLE COMPANY, COVENTRY.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

"NUGEPE" CEMENT.

JOHN E. WILLIAMS AND CO.
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PATENTS AND TRADE MARKS
PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

SULPHATE OF AMMONIA
SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

THE First Dutch Bog Ore Co., Ltd., (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

SULPHURIC ACID.

SPECIALLY prepared for the Manu- facture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

AMMONIACAL Liquor wanted by JOHN RILEY & SONS, Hapton, near ACCRINGTON.

COAL GAS TAR wanted.
ROBINSON BROTHERS, LIMITED. Works: WEST BROMWICH, KNOTTINGLEY, and SPONDON.

GAS Manager wanted by the Montrose Gaslight Company.
For Particulars, apply to ALEX. MUIRDEN, Chairman of the Company, MONTROSE.

REPRESENTATIVE wanted for the sale of Special Refractory Cement for Gas-Retorts and other Gas-Works purposes. Must have necessary Connection and be a pushing Salesman.
Apply, with full Particulars, References, Age, and Terms expected, to "REFRACTORY," care of Street's, 30, CORNHILL, E.C.

DRAUGHTSMAN Wanted, thoroughly familiar with Gasholders and general Gas-Works Plant, and capable of making Working Drawings and taking out Quantities for estimating or ordering Materials.
State Age, Experience, and Salary required.
C. & W. WALKER, Limited, Midland Iron-Works, Donnington, SHROPSHIRE.

GOSPORT GAS AND COKE COMPANY.

ENGINEER and Manager wanted for the above Company's Works, making about 100 Million cubic feet per Annum.
The Works include a Carburetted Water-Gas Plant.
House, with Rates, Coal, and Gas free.
Applications, stating Age, Experience, and Salary required, with *copies* only of recent Testimonials, to be sent to the SECRETARY on or before the 15th day of June, 1904.

THE Metropolitan Water Board are prepared to receive APPLICATIONS for the Office of CHIEF ENGINEER to the Board.
The Chief Engineer will be required to give his whole time to the service of the Board, and he must not be directly or indirectly engaged in private practice or other paid employment.
The Salary will be £2500 a Year, and the appointment will be held during the pleasure of the Board.
Applications, accompanied by *copies* of Three recent Testimonials, must be on Forms to be obtained from the Clerk of the Board, Caxton Hall, Westminster, S.W., and must be delivered to him at that address in sealed envelopes, endorsed "Chief Engineer," not later than Ten o'clock a.m., on Friday, June 10, 1904.
Personal canvassing is strictly prohibited, and will disqualify Candidates.
A. B. PILLING,
Clerk of the Board.
Caxton Hall, S.W.,
May 18, 1904.

OXIDE OF IRON.
(NATURAL.)

BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.
BALE'S FIRE CEMENT, PAINT, AND GAS COAL
5, CROOKED LANE, LONDON, E.C.

COAL GAS TAR wanted.
BEST PRICES GIVEN.
SHARPNESS CHEMICAL COMPANY, LIMITED, Sharpness Docks, GLOS.

WANTED, a second-hand Condenser for Condensing Gases from Ammonia Stills.
Address No. 4219, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Modern Tower Scrubber, 6 or 8-inch Connections, about 30 ft. by 5 ft., and may have Water Distributor. Good Second-Hand preferred.
Specification and Price, &c., to No. 4203, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Two 6 feet by 6 feet Puri- FIERS, by Dempster, with two Four-Way Valves. Replaced by larger
Apply to A. E. ASHLEY, Manager, Gas-Works, NESTON.

CONDENSER for Sale. In splendid Condition. Cheap. Capacity 250,000 Cubic Feet per Twenty-four hours.
Apply to A. E. LAYTON, Manager, Gas-Works, REDDITCH.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

GASHOLDER, 40 ft. diameter by 14 ft. deep, in wrought Tank, with six Columns, trellis Girders, and Suspension Gear. In splendid condition. Nearly new.
New GASHOLDER, 40 ft. diameter by 12 ft. deep, with Steel Standards; also new STEEL TANK to contain same.
Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of 12,500 Tons of COAL and 500 Tons of CANNEL.
Specification and Form of Tender may be obtained upon application to Mr. W. Whatmough, Gas Manager.
Sealed Tenders, endorsed "Coal," to be sent to me not later than Tuesday, June 14, 1904.
By order,
GEO. G. BOUCHIER,
Town Clerk.
Municipal Buildings,
Heywood, May 18, 1904.

THE Directors of the Keswick Gas Company invite TENDERS for the supply of 1700 Tons of best screened GAS COAL, or NUTS, to be delivered at Keswick Railway Station, between the 1st of July, 1904, and the 30th of June, 1905, in such quantities and at such times as may be required.
Tenders, stating price per ton, endorsed "Tenders for Coal," to be sent to the undersigned not later than the 22nd inst.
The Directors do not bind themselves to accept the lowest or any Tender.
J. H. BRODIE,
Secretary.
Main Street, Keswick,
June 2, 1904.

THE Directors of the Keswick Gas Company invite TENDERS for their surplus TAR and AMMONIACAL LIQUOR, for Twelve Months from the 30th inst., at per ton delivered into Contractor's Tanks at Keswick Railway Station.
Sealed Tenders, endorsed "Tenders for Tar or Liquor," will be received by the undersigned on or before Wednesday, the 22nd inst.; but the Directors do not bind themselves to accept the highest or any Tender.
J. H. BRODIE,
Secretary.
Main Street, Keswick,
June 2, 1904.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

COUNTY BOROUGH OF WARRINGTON.
(GAS DEPARTMENT.)

THE Gas Committee of the above Borough invite TENDERS for the supply of 30,000 Tons of COAL and 5000 Tons of CANNEL, or part thereof.

Full Particulars can be obtained on application to Mr. W. S. Haddock, Engineer to the Works.

Sealed Tenders, endorsed, addressed to the Chairman of the Gas Committee, Gas Offices, Warrington, must be sent in not later than June 16 next.

FREDK. TAYLOR,
Secretary.

Gas Offices, Warrington, May 30, 1904.

THE Corporation of Middleton are prepared to receive TENDERS for the supply of 5000 Tons of COAL and CANNEL, delivered at the Middleton Railway Station.

Further Particulars and Form of Tender may be obtained from Mr. E. E. J. Anderson, M.Inst.M.E., Gas Engineer.

All persons or firms tendering for this Coal or Cannel must pay their Workpeople the Standard or Trades Union rate of wages at least, and observe the Trade conditions which attach to the various kinds of work for which a Tender is sent in.

Tenders, addressed to the Chairman of the Gas, &c., Committee, and endorsed "Tender for Coal and Cannel," to be delivered at my Office not later than Wednesday, the 8th of June, 1904.

The Corporation do not bind themselves to accept the lowest or any Tender.

FREDERICK ENTWISTLE,
Town Clerk.

Town Hall, Middleton,
May 20, 1904.

THE Corporation of Middleton are prepared to receive TENDERS for SUNDRY STORES for the Year ending March 31, 1905, consisting of the following: LIME, VITRIOL, METERS, BRASS MAIN COCKS, TUBES and FITTINGS, OILS (Gas-Engine, Cylinder, Engine, Boiled, Exhauster, and Conveyor Lubricant), and BENZOL; and also for the purchase of the surplus TAR made at their Gas-Works during the same period (about 700 Tons).

Further Particulars, Specifications, and probable Quantities may be obtained on application to Mr. E. E. J. Anderson, M.Inst.M.E., Gas Engineer.

All persons or firms tendering for these Articles must pay their Workpeople the Standard or Trades Union rate of wages at least, and observe the Trade conditions which attach to the various kinds of work for which a Tender is sent in.

Tenders, addressed to the Chairman of the Gas, &c., Committee, endorsed "Tender for Sundry Stores," as the case may be, must be delivered at my Office on or before Wednesday, the 8th of June, 1904.

The Corporation do not bind themselves to accept the lowest or any Tender.

FREDERICK ENTWISTLE,
Town Clerk.

Town Hall, Middleton,
May 20, 1904.

CORPORATION OF NEWBURY.
(GAS DEPARTMENT.)

STEEL GASHOLDER AND TANK.

THE Corporation of Newbury are prepared to receive TENDERS for the supply and erection at their Gas-Works, Newbury, of a Telescopic GASHOLDER, and STEEL TANK, on Foundations to be prepared by the Engineer.

Dimensions:—

Steel Tank	86 ft.	diameter by 21 ft.	deep.
Inner Lift of Holder	80 ft.	,, by 20 ft.	,,
Second Lift of do.	82 ft.	,, by 20 ft.	,,

Plans and Specifications may be obtained by application, in writing, from the undersigned, on payment of the sum of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.

Sealed Tenders are to be addressed to the Chairman and Committee, Gas-Works, Newbury, and lodged at this Office by Twelve o'clock, noon, on Monday, June 20 inst.

The Committee do not bind themselves to accept the lowest or any Tender.

W. R. DAVEY,
Engineer and Manager.

Gas-Works, Newbury,
June 4, 1904.

CORPORATION OF NEWBURY.
(GAS DEPARTMENT.)

TENDERS FOR SUPPLY OF COAL.

THE Gas Committee of the Corporation of Newbury are prepared to receive TENDERS for the supply of about 5000 Tons of good class GAS COAL, screened and unscreened, to be delivered at their Railway Siding (on the G.W. Ry.), Gas-Works, Newbury, during the period of Twelve Months between July 1, 1904, and June 30, 1905, in such quantities as may be agreed.

Tenders, to be endorsed "Tenders for Coal," and addressed to the Chairman of the Gas Committee, Gas-Works, Newbury, and lodged at this Office by Twelve o'clock, noon, on Tuhrsday, the 16th of June inst.

Forms of Tender upon application, in writing, from the undersigned.

The lowest or any Tender not necessarily accepted.

W. R. DAVEY,
Manager.

Gas-Works, Newbury,
June 4, 1904.

HARLOW AND SAWBRIDGEWORTH GASLIGHT AND COKE COMPANY, LIMITED.

TENDERS are invited for the supply of 1500 Tons of best GAS COAL, delivered free at Harlow Station, in such quantities, monthly, as may be required between July 1, 1904, and June 30, 1905.

No special Form of Tender provided.

Tenders, to be endorsed "Tender for Coal," giving full Particulars of the Coal offered, to be sent to me on or before June 24.

W. E. DEARDS,
Secretary.

Harlow.

THE Stretford Gas Company are prepared to receive TENDERS for the surplus Gas TAR and AMMONIACAL LIQUOR produced at their Works (together or separately) for a period of One, Two, or Three Years commencing July 1, 1904.

The Directors are prepared to make the contract on the Sliding-Scale basis or otherwise.

Tenders to be sent in, addressed to the Chairman, endorsed "Tender for Tar, &c.," on or before Tuesday, June 14, 1904.

Form of Tender may be obtained from the Secretary.

The Directors do not bind themselves to accept the highest or any Tender.

BENJAMIN HAYNES,
Secretary.

Stretford, May 20, 1904.

TENDERS FOR COAL.

THE Directors of the Stretford Gas Company invite TENDERS for the supply of screened and unscreened GAS COALS, GAS NUTS, and GAS SLACK, to be delivered during the next One, Two, or Three Years, in Monthly quantities as may be required.

Sealed Tenders to be sent to the Chairman of the Company not later than Tuesday, June 14, 1904, endorsed "Tender for Coal."

Form of Tender to be obtained from the Secretary, Gas-Works, Stretford.

The lowest or any Tender not necessarily accepted.

By order of the Board,
BENJAMIN HAYNES,
Secretary.

Stretford, May 20, 1904.

URBAN DISTRICT COUNCIL OF STOURBRIDGE.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the purchase of their surplus TAR during the Twelve Months ending June 30, 1905.

Tenders, endorsed "Tar," addressed to the Chairman of the Gas Committee, to be sent to me on or before Tuesday, June 14, 1904.

The highest or any Tender not necessarily accepted.

By order of the Committee.
WM. NORTH,
Engineer and Manager.

Gas-Works, Stourbridge,
May 24, 1904.

URBAN DISTRICT COUNCIL OF STOURBRIDGE.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply and delivery on to their Gas-Works of about 17,000 Tons of good screened GAS COAL or NUTS.

Forms of Tender may be had on application to the undersigned, and only Offers on these Forms will be considered.

Tenders, endorsed "Gas Coal," addressed to the Chairman of the Gas Committee, to be sent to me at the Gas-Works, Stourbridge, on or before Tuesday, June 14, 1904.

The lowest or any Tender not necessarily accepted.

By order of the Committee,
WM. NORTH,
Engineer and Manager.

Gas-Works, Stourbridge,
May 24, 1904.

TENDERS FOR GAS COAL.

THE Gas Committee of the Carnarvon Corporation invite TENDERS for the supply of 3300 Tons of best screened GAS COAL and 200 Tons of screened CANNEL, to be delivered free as required in Trucks on the Gas-Works Siding, Carnarvon, during the Twelve Months ending the 31st of August, 1905.

Sealed Tenders, endorsed "Tender for Coal." and addressed to the Chairman of the Gas Committee, Guildhall, Carnarvon, to be delivered on or before Thursday, the 23rd inst.

The Committee reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Forms of Tender and Specification to be had on application to the undersigned.

WILLIAM M. RUXTON,
Manager.

Gas Office, Carnarvon,
June 3, 1904.

TENDERS FOR TAR.

THE Gas Committee of the Carnarvon Corporation invite TENDERS for the purchase of the surplus TAR made at their Works during the Twelve Months ending the 31st of August, 1905.

The Tar will be loaded free into Contractor's Tank-Trucks on Rail at the Gas-Works Siding, Carnarvon.

Payments: Net Cash Monthly.

Sealed Tenders, endorsed "Tender for Tar," and addressed to the Chairman of the Gas Committee, Guildhall, Carnarvon, to be delivered on or before Thursday, the 23rd inst.

The Committee do not bind themselves to accept the lowest or any Tender.

Any further Information may be had from the undersigned.

WILLIAM M. RUXTON,
Manager.

Gas Office, Carnarvon,
June 3, 1904.

LEAMINGTON PRIORS GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Leamington Priors Gas Company are prepared to receive TENDERS for the supply of GAS COAL required by them during Twelve Months from the 1st of July next.

Particulars and Forms of Quotation may be obtained from the undersigned.

Tenders must be sent in on or before Tuesday, the 21st of June.

THOMAS BERRIDGE,
Engineer and Secretary.

NEW MILLS URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL, &c.

THE New Mills Urban District Council invite TENDERS for the supply of 2500 Tons of best GAS COAL and 200 Tons of CANNEL for the Year ending June 30, 1905.

Forms of Tender and full Particulars may be had on application to the Gas Manager.

TENDERS are also invited for the purchase of the surplus TAR and LIQUOR for One Year ending June 30, 1905.

Tenders, properly endorsed, to be sent to me, the undersigned, not later than June 14, 1904.

The Council do not bind themselves to accept the lowest or any Tender.

J. POLLITT,
Clerk.

Town Hall, New Mills,
May 31, 1904.

TAR AND AMMONIACAL LIQUOR.

THE Lymm Urban District Council are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Gas-Works, for a term of One Year from the 1st day of July, 1904 (or for such longer term as may be contracted for with the consent of the Council).

Tar and Liquor will be delivered free into Contractor's Boat on the Bridgwater Canal.

Tenders, to be sent to the undersigned on or before the 22nd day of June, 1904, endorsed "Tar."

The purchaser will be required to enter into an agreement with the Council for the due performance of his Contract.

The Council do not bind themselves to accept the highest or any Tender.

Forms of Tender are not supplied.

Further Particulars may be had on application to the Gas Manager, Mr. W. L. Donaldson.

W. MULLARD,
Clerk.

Council Offices, Lymm, Cheshire.
June 3, 1904.

URBAN DISTRICT COUNCIL OF LYMM.

THE above Council are prepared to receive TENDERS for the supply of CANNEL and best screened GAS COAL, to be delivered at their Gas-Works in Lymm, for a term of Twelve Months from the 1st day of July, 1904.

The probable quantities required will be about 250 Tons of Cannel and about 1800 Tons of Gas Coal, which must be freshly wrought, well screened, and free from Sulphurous Pyrites and other Objectionable Matter; but the Council reserve the right of increasing or decreasing the quantities named.

The person whose Tender is accepted will be required to enter into an agreement with the Council for the due performance of his Contract.

Sealed Tenders, stating price per ton delivered alongside the Works, to be sent to the undersigned on or before the 22nd day of June, 1904, and endorsed "Coal Tender."

The Council do not bind themselves to accept the lowest or any Tender.

Forms of Tender are not supplied.

Further Particulars may be had on application to the Gas Manager, Mr. W. L. Donaldson.

W. MULLARD,
Clerk.

Council Offices, Lymm, Cheshire,
June 3, 1904.

CITY OF NOTTINGHAM.
(WATER DEPARTMENT.)

TENDERS for the Supply of Valves and HYDRANTS, PIPES, LEAD, COAL, TAPS, and FITTINGS.

The Water Committee of the Corporation are prepared to receive TENDERS from competent Ironfounders, Brassfounders, Valve Manufacturers, Lead Merchants, and Colliery Proprietors and Coal Merchants for the supply of the under-mentioned goods for the ensuing Year:—

1.—CAST-IRON DOUBLE-FACED SLUICE VALVES and HYDRANTS.
2.—CAST-IRON MAIN PIPES.
CAST-IRON SPECIAL PIPES.
3.—LEAD PIPING.
LEAD INGOTS.
4.—GUN METAL TAPS & FERRULE FITTINGS.
5.—STEAM COAL and OTHER FUEL.

Specifications and Drawings, together with Samples, Weights, &c., may be seen, and other Information obtained, at the Office of the Water Manager, Mr. Stephen Moore, St. Peter's Church Side, and Forms of Tender may be obtained at that Office on payment of One Guinea, which sum will be returned on receipt of a *bonâ-fide* Tender.

Tenders, endorsed "Tender for Valves," "Tender for Pipes," "Tender for Lead," "Tender for Taps," or "Tender for Coal," to be delivered to me at the Guildhall, Nottingham, on or before the 25th day of June next.

Samples of Coal for testing purposes must be sent in not later than the 15th of June, or the Tenders will not be considered.

The Committee do not bind themselves to accept the lowest or any Tender.

By order of the Water Committee,
SAMUEL G. JOHNSON,
Town Clerk.

Guildhall, Nottingham, May 27, 1904.

THE Corporation of the City of Bangor are prepared to receive TENDERS for the GAS COAL required at their Gas-Works during the ensuing Year, in such quantities and at such times as may be required (in all 4000 Tons) from the 1st of August, 1904, to the 31st of July, 1905.

The person whose Tender is accepted will be required to enter into an agreement with the Council for the due performance of his Contract.

The lowest or any Tender not necessarily accepted. The Council also reserve the right to divide the contract between two or more Contractors.

Further Information, and Forms on which the Tenders must be made, may be obtained on application to the undersigned.

Sealed Tenders, addressed to the Chairman of the Lighting Committee, must be delivered on or before the 20th of June.

JOHN SMITH,
Manager.

Gas-Works, Bangor, May 28, 1904.

BELPER GAS AND COKE COMPANY.

TENDERS FOR COAL.

THE Directors are prepared to receive TENDERS for the supply at their Works, situate near the Railway Station, Belper, of 2000 Tons (more or less) of GAS COAL (part in the Gas Company's own waggons); also about 200 Tons (more or less) of CANNEL COAL, to be delivered at such times, and in such quantities, as the Directors or their authorized servants shall from time to time order.

Sealed Tenders, stating price per Ton and Information as to the quality and quantity of Gas the Coal is estimated to produce, also as to where the same is now in use, to be sent to the undersigned, on or before Saturday, June 11.

The Directors do not bind themselves to accept the lowest or any Tender, nor to take the whole of the above quantities of Coal or Cannel.

By order,
JOSEPH PYM,
Managing-Director.

Belper, May 30, 1904.

HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD.

THE above Board are prepared to receive TENDERS for the supply of COAL and CANNEL required at their Gas-Works, Hebden Bridge, during the Twelve Months ending July 31, 1905. The probable quantity will be about 7000 to 8000 Tons.

Also for the surplus TAR and LIQUOR made at their Gas-Works during the Six Months ending Dec. 31, 1904.

The Tar and Liquor will be loaded free in Contractor's Tanks on the Gas-Works Siding, Hebden Bridge Station (L. & Y. Railway).

Further Particulars regarding the above may be had on application to the Engineer and Manager, Mr. E. J. Wellens.

Forms of Tender, either for Coal or Tar and Liquor, on receipt of stamped addressed envelope.

Sealed Tenders, endorsed "Tar and Liquor" or "Coal," as the case may be, to be addressed to the Chairman of the Gas Board, Gas Offices, Hebden Bridge, not later than Wednesday, June 8, 1904.

R. CRABTREE,
Clerk to the Council and Gas Board.

Gas-Works, Hebden Bridge,
May 21, 1904.

BOROUGH OF LEIGH.

(GAS AND WATER DEPARTMENTS.)

THE Gas and Water Committee of the above Corporation are prepared to receive TENDERS for the supply of the following goods:—

(1) 14,000 Tons of screened Arley GAS COAL, and NUTS.
(2) LEAD PIPE.
(3) VITRIOL.
(4) LIME.
(5) BENZOL.
(6) 2-inch and 3-inch Cast-Iron PIPES.

Forms of Tender may be obtained on application from the undersigned, to whom all inquiries must be addressed.

Sealed and endorsed Tenders must be delivered to Mr. Peregrine Thomas, Town Clerk, Town Hall, Leigh, Lancashire, on or before Twelve o'clock noon on Saturday, the 11th day of June next.

The Corporation do not bind themselves to accept the lowest or any Tender, and reserve to themselves he right to divide any Tender.

JAMES GIBSON,
Engineer and Manager.

Gas and Water Offices,
Leigh, May 28, 1904.

RHONDDA URBAN DISTRICT COUNCIL.

(GAS AND WATER DEPARTMENT.)

THIS Council are prepared to receive TENDERS for the following:—

1.—The supply of 18,000 Tons of GAS COALS for the Year ending the 30th day of June, 1905, to be delivered at the Porth and Ystrad Gas-Works.
2.—Cast-Iron PIPES required during the Year ending the 30th day of June, 1905.

Specifications and Forms of Tender may be obtained on application to the Engineer and Manager, Mr. Octavius Thomas, Gas and Water Offices, Pentre, Glam.

Contractors will be required to pay the standard rate of wages recognized in the District.

Tenders to be addressed to the Chairman of the Gas and Water Committee, endorsed "Tender for Coals," or "Tender for Cast-Iron Pipes," as the case may be, and delivered at my Office on or before Ten a.m. on Thursday, the 16th of June, 1904.

The Council do not bind themselves to accept the lowest or any Tender.

WALTER P. NICHOLAS,
Clerk.

Gas and Water Offices,
Pentre, Glam.
June 1, 1904.

READING GAS COMPANY.

TAR.

THE Directors of the Reading Gas Company invite TENDERS for the purchase of their surplus TAR for One Year, commencing on the 1st of July next.

Specifications for the Contract will be forwarded on application to the Engineer and Manager (Mr. Douglas H. Helps).

Railway communication direct to the Works.

Tenders, endorsed, "Tender for Tar," and addressed to the undersigned, must be delivered not later than Monday, June 20, 1904.

A. CANNING WILLIAMS,
Secretary.

7, King Street, Reading,
May 31, 1904.

CORPORATION OF MANCHESTER.

TENDERS FOR COAL AND CANNEL.

THE Gas Committee are prepared to receive OFFERS of high-class CANNELS, COALS, and NUTS suitable for Gas Making, for delivery at their Gaythorn, Rochdale Road, Bradford Road, and Droylsden Works, during a period of One or Two Years commencing Oct. 1, 1904.

Printed Forms of Tender may be obtained on application (in writing only) to Mr. Charles Nickson, Superintendent, Gas Department, Town Hall, Manchester; and Tenders, endorsed "Tender for Cannel, or Coal, or Nuts," as the case may be, must be delivered at the Gas Department, Town Hall, Manchester, before Ten o'clock on Wednesday morning, the 22nd of June, addressed to the Chairman of the Gas Committee.

By order of the Gas Committee.

WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
June 3, 1904.

TO COAL CONTRACTORS AND OTHERS.

THE Sedgley Urban District Council invite TENDERS for supplying 750 to 1000 Tons of GAS COAL, the deliveries to be made at the Shut End Siding, at such times and in such quantities as may be directed.

It is desirable that a statement of an analysis of the quality of a sample of the Coal to be supplied be sent with the Tender.

Sealed Tenders, marked "Coal," must reach me on or before the 9th of June, 1904.

The Council do not bind themselves to accept the lowest or any Tender.

By order of the Council,
JOSEPH SMITH,
Clerk.

Offices: High Holborn, Sedgley,
May 21, 1904.

COUNTY BOROUGH OF ROTHERHAM.

THE Gas Committee invite Tenders for the supply and delivery at the Gas-Works, Frederick Street, Rotherham, of 22,000 Tons of COAL suitable for Gas Manufacturing Purposes.

Particulars can be obtained on application to the Gas Engineer.

The Contractor must not pay less than the standard rate of wages paid in the district, and must observe the proper conditions of labour, and no sub contracting will be allowed except by permission of the Corporation.

Sealed Tenders to be sent to me not later than the 20th inst., endorsed "Tender for Gas Coal."

The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
W. J. BOARD,
Town Clerk.

Town Hall, Rotherham,
June 2, 1904.

WORKSOP GAS COMPANY.

THE Directors of the Worksop Gas Company are prepared to receive TENDERS for the supply of 4500 Tons of the best screened GAS COAL, delivered at Worksop Station between the 1st of July next and the 30th of June, 1905, in such quantities and at such periods as may be ordered from time to time.

To be as free as possible from Sulphur, Bats, Bind, Refuse, and Dirt, and shall be weighed (20 cwt. to the ton) upon the Company's Machine.

Tenders to be sent in to the undersigned on or before the 13th of June, 1904.

No Special Form of Tender provided.

The Directors reserve to themselves the right to accept Tenders for the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
F. KENT,
Manager.

June 1, 1904.

HONLEY URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee of the Honley Urban District Council invite TENDERS for the supply of about 2000 Tons of GAS COAL (Slack) and about 200 Tons of CANNEL, delivered at the Honley Railway Station (L. & Y. Railway), in such quantities and at such times as may be required during the Year ending June 30, 1905.

Tenders, sealed and endorsed, to be forwarded to the undersigned not later than the 22nd day of June, 1904.

The Committee do not bind themselves to accept the lowest or any Tender.

The Committee are also prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at the Gas-Works during the Year ending June 30, 1905.

The highest or any Tender not necessarily accepted.

No forms of Tender supplied.

HARRY MARSDEN,
Manager.

BRIERLEY HILL DISTRICT GASLIGHT COMPANY.

TENDERS FOR TAR.

THE Directors invite Offers for the surplus TAR made at their Brierley Hill and Kingswinford Works, to be taken between July 1 next and June 30, 1905, delivered into Buyers' Boats.

The Directors do not bind themselves to accept the highest or any Tender.

Tenders, to be addressed to the Chairman, endorsed "Tender for Surplus Tar," not later than June 24, 1904.

HENRY M. JACKSON,
Secretary.

Board-Room, Gas-Works,
Brierley Hill, June 1, 1904.

BOROUGH OF CONGLETON.

THE Gas Committee invite Tenders for the following:—

1.—TAR AND AMMONIACAL LIQUOR.

The purchase of TAR and AMMONIACAL LIQUOR which will be produced during the Twelve Months ending June 30, 1904.

Form of Tender and Conditions may be obtained from the undersigned.

2.—LIME.

The supply of about 120 Tons of Best Hand-Picked LIME for Purifying Purposes, to be delivered in Sender's or Railway Company's Trucks at Brunswick Wharf, Congleton, at such times as may be required during the Twelve Months ending June 30, 1904. No special Form required.

Tenders, endorsed "Tar" and "Lime" respectively, to be delivered at the Office of E. A. Plant, Esq., Town Clerk, Congleton, on or before Saturday, the 11th day of June, 1904.

The Committee do not bind themselves to accept the lowest or any Tender.

JAMES SMITH,
Engineer and Manager.

BRIDGNORTH CORPORATION GAS-WORKS.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee are prepared to receive sealed TENDERS for the supply of GAS COAL, including carriage to the Bridgnorth Railway Station, for One Year from, or soon after, the end of July next.

Evidence as to the quality of the Coal must accompany each Tender.

Quantity required: About 2300 Tons to 2600 Tons, in proportionate deliveries as directed—say, 70 per cent. during Winter Months, and 30 per cent. during Summer Months.

Sealed and marked Tenders must be sent to the undersigned not later than Thursday, the 16th of June.

The Committee reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Official Forms for Tender are not furnished.

By order,
J. H. COOKSEY,
Town Clerk, Secretary.

Bridgnorth,
May 27, 1904.

BUXTON URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for:—

GAS COAL AND CANNEL.

The supply of 7000 Tons of Best Screened GAS COAL and 3500 Tons of CANNEL to be delivered as required at the Gas-Works Siding, Midland Railway, Buxton, during the Twelve Months ending July 31, 1905, in accordance with the Specification and Conditions, which may be obtained from Mr. H. Barker, Gas Engineer, Town Hall, Buxton.

TAR AND AMMONIACAL LIQUOR.

The purchase of the Surplus TAR and the whole of the AMMONIACAL LIQUOR which is produced, and delivered into purchaser's Tank-Waggons at the above mentioned siding, during the Twelve Months ending June 30, 1905.

Forms of Tender may be obtained from the Gas Engineer.

Sealed Tenders, endorsed "Coal," "Cannel," "Tar," "Liquor," respectively, are to be delivered to the undersigned on or before Monday, June 13, 1904.

The Committee do not bind themselves to accept any Tender.

JOSIAH TAYLOR,
Clerk.

Town Hall, Buxton,
May 27, 1904.

BUXTON URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committe invite Tenders for the following work, to be executed at the Gas-Works, Ashwood Dale, Buxton.

CONTRACT No. 14.

The Materials and Work required in the supply and erection of SLATED IRON VENTILATORS, &c., on the Roofs of the Retort-Houses.

CONTRACT No. 15.

The supply and erection of a combined STEAM ENGINE and EXHAUSTER (capacity 40,000 cubic feet per hour), also the TAKING DOWN and REFIXING of a Horizontal STEAM ENGINE and EXHAUSTER.

Specifications and Forms of Tender may be obtained from, and plans seen, on application to Mr. H. Barker, Gas Engineer, Gas-Works Office, Buxton, on payment of £1 1s. in each case, which will be returned on receipt of a *bond-fide* Tender.

Sealed Tenders, endorsed "Ventilators" or "Exhauster," to be delivered to the undersigned not later than Monday, June 13, 1904.

The Committee do not bind themselves to accept the lowest or any Tender.

JOSIAH TAYLOR,
Clerk.

Town Hall, Buxton,
June 1, 1904.

TAR Contracts Wanted on the Sliding-Scale or at Fixed Prices.

Managers and Secretaries desirous of selling to best advantage please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

TAUNTON GASLIGHT AND COKE COMPANY.

THE Directors are prepared to receive TENDERS for the supply of COAL over One or Two Years.

Particulars may be had from the Secretary.

Tenders, addressed to the Chairman, and endorsed "Tenders for Coal," to be delivered by the 10th of June.

A. EDWARDS,
Secretary and Manager.

MASTERTON (N.Z.) CORPORATION GAS-WORKS.

TENDERS are invited for Two New PURIFIERS 10 or 12 feet square by 4 or 5 feet deep, without Grids, with 8-inch Connections and Single Valves to each Inlet and Outlet.

Apply, giving full Particulars and stating Price either c.i.f. Wellington (N.Z.) or f.o.b. London, to

DOUGLAS DOBSON, Assoc.M.Inst.C.E.,
Manager.

KEIGHLEY CORPORATION GAS-WORKS.

THE Gas Committee invite Tenders for the supply of B. O. VITRIOL and LIME, and the purchase of SPENT OXIDE, during the Twelve Months commencing on the 1st of July next.

Particulars and Form of Tender supplied on application.

Tenders to be delivered on or before the 20th inst.

JOHN LAYCOCK,
Gas Engineer.

Gas Offices, Cook Lane,
Keighley, June 1, 1904.

COUNTY BOROUGH OF OLDHAM.

THE Oldham Corporation Gas-Works Committee are prepared to receive TENDERS for the supply of about 100,000 Tons of COAL required by them during the Year ending the 30th of June, 1905.

Specifications and Forms of Tender can be obtained on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom Tenders are to be sent on or before Tuesday, the 14th of June, 1904.

J. H. HALLSWORTH,
Town Clerk.

Oldham, May 24, 1904.

TENDERS FOR GAS COAL.

THE Corporation Gas Committee of Stoke-upon-Trent invite TENDERS for the supply of 14,000 Tons of GAS COAL.

Specification and Form of Tender may be obtained on application to the undersigned, or at the Gas Offices.

Tenders to be sent in not later than Twelve o'clock noon on the 15th day of June, 1904, addressed to F. Geen, Esq., J.P., Chairman of the Gas Committee, Stoke-upon-Trent, and endorsed "Tender for Gas Coal."

WM. PRINCE,
Engineer and Manager.

Gas Offices, Stoke-upon-Trent,
May 16, 1904.

ETON GAS COMPANY.

THE Directors of the Eton Gas Company invite TENDERS for the supply of about 1000 Tons of the best GAS COAL, to be delivered free at the Windsor Station of the South-Western Railway; also about 100 Tons of CANNEL COAL.

The Directors do not bind themselves to accept the lowest or any Tender.

Tenders to be delivered on or before Saturday, the 18th day of June, 1904, addressed to the Chairman, Gas Office, 10, High Street, Eton, Bucks.

By order,
J. NEEDHAM,
Secretary.

May 31, 1904.

HEXHAM GAS COMPANY.

COAL CONTRACT.

THE Directors of the above Company are prepared to receive TENDERS for the supply of about 4500 Tons (or part thereof) of unscreened GAS COAL delivered at Hexham Station, or at the Company's Works, as required during the Year ending June 30, 1905.

Tenders, endorsed "Coal Contract," stating the name of the pit at which the Coal is raised, to be forwarded to the undersigned not later than Monday, June 13, 1904.

HERBERT LEES,
Engineer and Secretary.

Gas Offices, Hexham,
May 24, 1904.

CORPORATION OF LANCASTER.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of GAS COAL and NUTS, to be delivered on the Gas-Works Siding, Lancaster, in such quantities and at such times as may be required during a period of Twelve Months commencing delivery July 1 next.

Sealed Tenders, endorsed "Gas Coal," giving full Particulars of the Coal offered, must be delivered to T. C. Hughes, Esq., Town Clerk, Lancaster, on or before Wednesday, June 15.

Any further Information and Forms of Tender may be obtained on application to the undersigned.

C. ARMITAGE,
Manager.

Gas-Works, Lancaster.

TENTERDEN GAS COMPANY.

COAL.

TENDERS are invited for the supply of 600 Tons, more or less, of best GAS COAL, at the following Stations, at such times and in such quantities as may be required: Appledore, Headcorn, and Robertsbridge (S. E. & C. Railway), also Rolvenden and Tenterden Town (Rother Valley Light Railway).

Tenders, with Analysis and full Particulars of the Coal offered, to be sent to me on or before Friday, the 17th of June inst.

The lowest or any Tender not necessarily accepted.

GEO. F. VARTY,
Secretary.

Tenterden, Kent, June 4, 1904.

BAKEWELL URBAN DISTRICT COUNCIL.

TENDERS are invited for the supply of GAS COAL, 1200 to 1400 Tons, and 100 Tons of CANNEL, for One Year ending the 30th of June, 1905, delivered at Bakewell Station, Midland.

Also for the PURCHASE of surplus TAR and AMMONIACAL LIQUOR delivered in purchasers' Tanks at Bakewell Station.

Forms of Tender and Particulars can be obtained from the undersigned, to whom Tenders must be sent by the 30th of June.

The lowest or any Tender will not necessarily be accepted.

V. R. COCKERTON,
Clerk.

Bakewell.

LINCOLN CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR COAL.

THE Gas Committee of the Lincoln Corporation invite TENDERS for the supply of 26,000 Tons of screened or unscreened GAS COALS, to be delivered during a period commencing the 1st of July, 1904, and terminating the 30th of June, 1905.

Further Particulars and Forms of Tender may be obtained from the undersigned.

Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered on or before the 18th of June next.

The Committee do not bind themselves to accept the lowest or any Tender.

JNO. CARTER,
Manager.

Gas Offices, Lincoln, May 30, 1904.

WIRKSWORTH GASLIGHT AND COKE COMPANY, LIMITED.

TENDERS FOR GAS COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of about 800 Tons of GAS COAL, to be delivered at the Midland Railway Station, Wirksworth, in such quantities as the Manager shall from time to time direct.

Also for the purchase of the surplus TAR and LIQUOR made at their Works during the Twelve Months commencing the 1st day of July next.

The Coal must be freshly wrought and free from Sulphurous Pyrites and other Objectionable Matter.

Sealed Tenders, endorsed "Coal," to be delivered to the undersigned not later than June 25, 1904.

S HALSTEAD,
Secretary and Manager.

Gas Offices, Derby Road,
Wirksworth, May 21, 1904.

GAINSBOROUGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee of the above Council invite TENDERS for the supply of 6000 Tons of best GAS COAL (Screened, Unscreened, or Nuts), to be delivered at the Great Central Railway Station, Gainsborough, between the 1st of July, 1904, and the 30th of June, 1905, in such quantities, monthly, as may be required.

Sealed Tenders, endorsed "Tender for Gas Coal," giving full Particulars of the Coal offered, to be addressed to the Chairman of the Gas Committee, must be delivered at the Gas-Works, Gainsborough, not later than the 23rd inst.

No special Form of Tender issued.

The Committee do not bind themselves to accept the lowest or any Tender.

JOHN BALDWIN,
Manager.

Gas-Works, Gainsborough,
June 4, 1904.

MARKET HARBOROUGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL AND SULPHURIC ACID.

THE Gas Committee invite Tenders for—

GAS COAL.

The supply of the whole or part of 4000 Tons of best screened GAS COAL or NUTS, to be delivered as may be required during the Year ending June 30, 1905, at the Sidings of the London and North-Western or Midland Railway Station, Market Harborough.

SULPHURIC ACID.

The supply of SULPHURIC ACID, to be delivered in senders' Carboys at Market Harborough Station as may be required during the Year ending June 30, 1905.

Conditions and Form of Tender may be obtained from the undersigned, to whom sealed Tenders, endorsed "Coal" and "Sulphuric Acid," respectively, must be delivered not later than Friday, the 24th inst.

The lowest or any Tender not necessarily accepted.

A. T. HARRIS,
Manager and Secretary.

Gas Office, St. Mary's Road,
Market Harborough, June 4, 1904.

BOROUGH OF WOKINGHAM.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of 1200 Tons of GAS COAL, Screened or Unscreened, to be delivered during One Year from the end of June next.

Particulars may be obtained upon application to Mr. Francis H. Wood, Gas Manager.

Sealed Tenders to be delivered at the Gas Office not later than Tuesday, June 14, 1904, addressed to the Chairman of the Gas Committee, and endorsed, "Tenders for Coal."

No Tender Forms supplied.

By order,
JOHN HEADINGTON,
Chairman.

June 2, 1904.

GREAT WESTERN RAILWAY.

THE Directors of this Company are prepared to receive TENDERS for the purchase of—

GAS TAR AND AMMONIACAL LIQUOR.
HYDROCARBON FROM OIL-GAS WORKS.
FURNACE SLAG, FETTLING, AND MILL SCALE.
TARPAULIN CUTTINGS AND SHEET TIES.
DIRTY GREASE.

Forms of Tender (upon which alone Tenders will be received), may be obtained on application to the undersigned, by whom Tenders, marked outside "Tender for Residuals," will be received on or before Tuesday, the 28th of June.

The Directors do not bind themselves to accept the highest or any Tender.

G. K. MILLS,
Secretary.

Paddington Station, London,
June 3, 1904.

COUNTY BOROUGH OF BURY

COALS.

THE Gas Committee are prepared to receive TENDERS for the supply of the following COALS:—

40,000 Tons (approximately) of GAS COAL.
300 " " BURGY.
300 " " HOUSE COAL.

Forms of Tender and Conditions of Contract may be obtained on application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

Tenders, endorsed "Gas Coal," to be sent to the office of the undersigned not later than Saturday, the 18th inst.

JOHN HASLAM,
Town Clerk.

Municipal Offices, Bury.
June 1, 1904.

BOROUGH OF SMETHWICK.

TENDERS FOR GAS COAL AND CANNEL.

THE Gas Committee invite Tenders for the supply of about 30,000 Tons of GAS COAL and NUTS, and 1000 Tons of CANNEL, for delivery during the Year ending the 30th of June, 1905.

Form of Tender and further Information may be obtained of the undersigned.

Sealed Tenders, endorsed, and addressed to the Chairman of the Gas Committee, Town Hall, Smethwick, to be sent in not later than the 23rd of June inst.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
W. J. STURGES,
Secretary.

Gas Offices, Town Hall, Smethwick,
June 2, 1904.

CITY OF HEREFORD.

THE Gas Management Committee of the Corporation invite TENDERS for the supply of best screened large GAS COAL for One Year, from the 1st of July next, to be delivered free at the Gas-Works Siding, Hereford, in such quantities as may be required from time to time.

The estimated quantity required will be about 13,000 Tons.

Full Particulars and printed Forms of Tender may be obtained on application to the undersigned.

Tenders, endorsed "Tender for Gas Coal," are to be sent in addressed to the Chairman, Gas Management Committee, Mansion House, Hereford, by Saturday, June 25, 1904.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM PARLBY,
Gas Engineer and Manager.

Gas-Works, Hereford,
June 3, 1904.

SHREWSBURY GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the Shrewsbury Gas-light Company, invite TENDERS for the supply of about 18,000 Tons of Screened GAS COALS, Washed NUTS, or Washed BEANS, and about 500 Tons of good English CANNEL, to be delivered free at the Great Western or London and North-Western Goods Yard, Shrewsbury, during the Year commencing July 1, 1904, and ending June 30, 1905.

The Directors reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Tenders must be made on forms (containing further Particulars) which may be obtained on application at the Company's Works, or by post, and must be sent to the undersigned, on or before the 18th day of June, 1904.

By order,
WM. BELTON, Assoc.M.Inst.C.E.,
Secretary and Manager.

Gas-Works, Shrewsbury,
May 20, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

BARKING GAS COMPANY.

NEW ISSUE OF £6000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors of the

MAIDENHEAD GAS COMPANY.

NEW ISSUE OF £4000 CONSOLIDATED ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors of the

ALDERSHOT GAS AND WATER COMPANY.

NEW ISSUE OF 350 £10 FIVE PER CENT. "G" PREFERENCE SHARES AND 350 £10 "G" ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart., E.C., on Tuesday, June 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors of the

ASCOT DISTRICT GAS COMPANY.

NEW ISSUE OF £4000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

HARTLEPOOL GAS AND WATER COMPANY.

IMPORTANT SALE OF GAS AND WATER STOCK.

TO BE SOLD by Auction, at the Com- pany's Offices, Middleton Road, West Hartlepool, on Tuesday, the 14th of June, 1904, at 2.30 p.m., precisely,

Mr. J. W. CROSBY, AUCTIONEER,

£10,000 (Nominal) of the NEW ORDINARY STOCK (Maximum Dividend, Five per Cent) authorized to be created and issued under the powers contained in the Company's Act, 1898.

The above Stock will be entitled to Dividend from the 1st of July next, if then fully paid-up, and will be registered in the name of the purchaser without charge.

A deposit of 10 per cent. will be required to be paid at the time of the sale, and the remainder on or before the 29th of June, 1904.

The Stock will be offered in lots of £100 each.

By order of the Directors.

W. SCOTT,
Secretary.

Hartlepool Gas and Water Company's Offices,
West Hartlepool, May 12, 1904.

SOUTHWARK AND VAUXHALL WATER COMPANY.

SALE BY TENDER OF THREE PER CENT. DEBENTURE STOCK.

NOTICE is Hereby Given, that it is the intention of the Directors of the Southwark and Vauxhall Water Company to SELL BY TENDER, to be received at the Company's Office, Southwark Bridge Road, S.E., not later than Twelve o'clock (noon) on Friday, June 10, 1904, £100,000 DEBENTURE STOCK of the Company.

The Stock now for Sale is part of the Capital authorized by, and to be issued under the provisions of, the Southwark and Vauxhall Water Act of 1898, and will be entitled from June 24, 1904, to Interest at the rate of £3 per cent. per annum. It will be known as Debenture Stock "B," and may be redeemed at par at the option of the Company any time after the expiration of Twenty-five Years from the date of issue, subject to six months' previous notice of the intention to redeem. Debenture Stock "B" will rank for interest *pari passu* with the other Debenture Stock of the Company, but before the Ordinary and Preference Stock and Share Capital.

On the transfer of the Water Companies to the Metropolitan Water Board, this Debenture Stock will have the advantage of the additional security provided by Section 15 of the Metropolis Water Act, 1902.

The Stock is a lawful investment for Trustees.

For Particulars, Forms, and Conditions of Tender, apply at the Office of the Company, Southwark Bridge Road, S.E.

By order of the Board of Directors,

MONTAGUE WATTS,
Secretary.

Southwark Bridge Road,
London, S.E., May 27, 1904.

By order of the Executors.

REIGATE GAS COMPANY.

£2130 ORDINARY STOCK and 119 £10 SHARES (£5 paid).

MAPLE & CO. have received Instruc- tions from the Executors of the late Richard Kelsey, Esq., to SELL the above BY AUCTION, at Laker's Hotel, Redhill, on Wednesday, June 22, 1904, at Six o'clock.

Particulars of the AUCTIONEERS, 109, King's Road, BRIGHTON, LONDON, and EASTBOURNE.

By order of the Executors.

EAST SURREY WATER COMPANY.

£4250 PREFERENCE STOCK.

MAPLE & CO. have received instruc- tions from the Executors of the late Richard Kelsey, Esq., to SELL the above BY AUCTION, on Wednesday, June 22, 1904, at Six o'clock.

Particulars of the AUCTIONEERS, 109, King's Road, BRIGHTON, LONDON, and EASTBOURNE.

BOOKS AND LEAFLETS

TO BE OBTAINED OF

WALTER KING,

11, BOLT COURT, FLEET STREET, E.C.

INTERNATIONAL ENGINEERING CONGRESS (GLASGOW, 1901))—THE PROCEEDINGS OF THE GAS SECTION. Edited by J. W. HELPS, M.Inst.C.E. *Price 5s.*

HANDBOOK FOR GAS ENGINEERS AND MANAGERS.—By THOMAS NEWBIGGING, M.Inst.C.E. (New Edition in course of Preparation).

CONSTRUCTION OF GAS-WORKS.—By HUGHES and O'CONNOR. *Price 6s.*

GAS LIGHTING.—By CHARLES HUNT. *Price 18s.*

GAS MANUFACTURE FOR STUDENTS.—By J. HORNBY. *Price 5s.*

GAS ENGINEERS' POCKET BOOK. — By H. O'CONNOR. *Price 10s. 6d.*

AGRICULTURAL VALUE OF GAS LIME.—By CHARLES D. PHILLIPS, J.P. *Price 10s. 6d. per 100.*

THE COMPOSITION AND USE OF GAS LIME IN AGRICULTURE.—By (the late) Dr. VOELCKER, Professor of Chemistry to the Royal Agricultural Society of England. *Price 5s. per 100.*

NOTES ON WATER SUPPLY.—By J. T. RODDA, Assoc.M.Inst.C.E., Assoc.M Inst.Mech.E., Member of the British Association of Water-Works Engineers. *Price 5s.*

Other Books supplied (Post Free) at Published Prices.

STEAM, OIL, and WATER.

Any Range of Pressure.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

ARMSTRONG'S

PATENT

CANDLE SAFETY LAMPS.

Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7 or 9 hours.

48, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

DOVER, The Ancient Cinque Port:

Reminiscences of an Ancient Freeman

(An ex-Secretary of a Suburban Gas Company).

PRICE - - - - 1s.

Publishers:

HORACE MARSHALL & SON,

TEMPLE HOUSE, TEMPLE AVENUE.

And 123, Fleet Street, London, E.C.

Order of Any Bookseller.

THOMAS DUXBURY & CO.,

16, DEANSGATE, MANCHESTER,

Gas Engineers' Agents and Contractors for METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.

Inquiries Solicited.

Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

THE

PETROLEUM GAS SYNDICATE

Supply and erect Complete Installations of their

PETROGENE PATENT GAS PLANT

On SALE, HIRE, or ROYALTY.

PETROGENE GAS is the most suitable Illuminant for all Towns, Villages, Factories, Institutions, &c., where a Cheap and Efficient Lighting System is required. It is equally suitable for Heating and Power purposes, and may be used with ordinary Gas Fittings, Stoves, Engines, &c. It may also be used in conjunction with Coal Gas, and affords Gas Companies a ready means of increasing their output without the expense of additional storage.

The Syndicate is prepared to entertain offers of sale of small Gas-Works, whether profit earning or not.

Offices: **28, Victoria St., Westminster.**

Works: **10, Rochester Row, S.W.**

HEATHCOTE GAS COAL.

Rich in Illuminating Power and yield of Gas.

Above the Average in Weight and Quality of Coke.

Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,

CHESTERFIELD.

THE

"ROTARY"

STATION METER.

Efficiency Demonstrated.

APPLY—

T. G. MARSH,

MAWSON CHAMBERS, DEANSGATE, MANCHESTER.

RAILS.

New and Second-Hand with all Accessories; also Tip Waggons and Turntables.

B. M. RENTON,

MIDLAND WORKS,

SHEFFIELD.

TROTTER, HAINES, & CORBETT, LIMITED,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
Shipments Promptly and Carefully Executed.

London Office: R. Cull, 34, Old Broad Street, E.C.

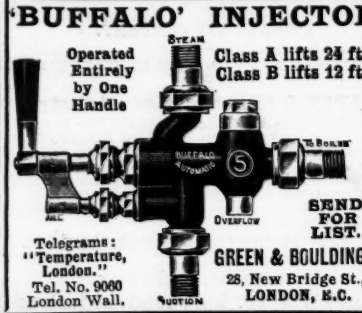
NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

JOHN HALL & CO.,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
Note.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

'BUFFALO' INJECTOR
Operated Entirely by One Handle
Class A lifts 24 ft.
Class B lifts 12 ft.


SEND FOR LIST.
Telegrams: "Temperature, London." Tel. No. 9060 London Wall.
GREEN & BOULDING, 28, New Bridge St., LONDON, E.C.

HENRY MILNES,
INGLEBY WORKS,
GIRLINGTON, BRADFORD.
Manufacturer of
HIGH-CLASS LATHES
For Sliding, Surfacing, Screw-cutting, and Plain Turning.
Milling Machines, Planing Machines, Slide Rests, Chucks, &c.

Lathes and Tools of my make may be inspected by any intending purchaser at addresses given below.
Agent for Scotland:
Thos. Hill & Co., 66, Robertson Street, Glasgow.
Agent for London: E. Padfield & Co., West India House, 96 & 98, Leadenhall Street, London, E.C.

THOMAS TURTON AND SONS, Limited,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

THE PATENT
"BEACON" GLOBE LAMP.

Largely adopted by many Local Authorities for Public Lighting, being absolutely Shadowless and Wind-proof.

H. GREENE & SONS, Limited,
Surrey Engineering Works,
Blackfriars Road, LONDON.
Telephone 1693 HOP.
Telegrams: "LUMINOSITY LONDON."

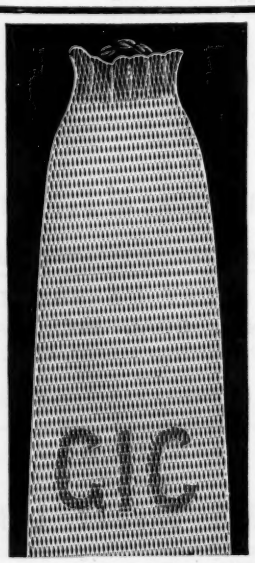
G.I.C.
RAMIE

G.I.C. Pure Ramie Mantles are rapidly becoming the recognized Maintenance Mantles with most Gas Companies and Lighting Authorities.

No better Mantle can be produced; therefore **why pay more?**

Made in 6 different sizes, from the Gem to the Lucas.

The difficult problem of Profitable Maintenance may be at once effectually solved by using this Mantle.



G.I.C.
RAMIE

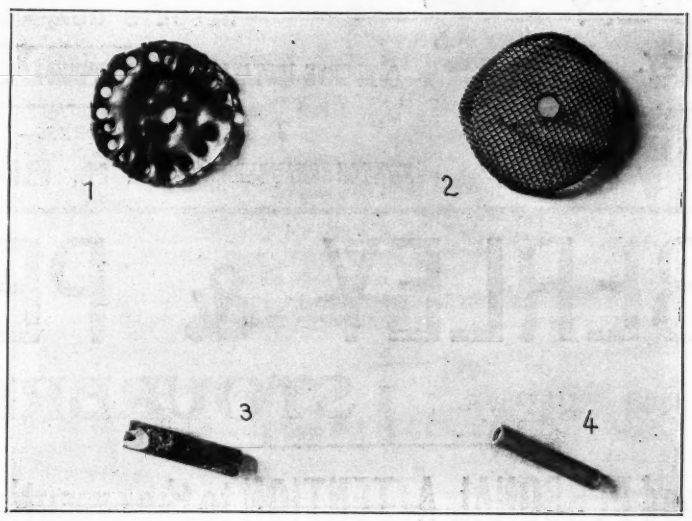
PRICES.	BURNERS.	Per Gross Subject.
G.I.C. Pure Ramie Mantle for "C."	.	27s.
G.I.C. ,, ,, ,,	No. "2" Kern	27s.
G.I.C. ,, ,, ,,	No. "3" ,,	27s.
G.I.C. ,, ,, ,,	No. "4" ,,	30s.
G.I.C. ,, ,, Long ,,	High Pressure	45s.
G.I.C. ,, ,, ,,	Lucas Lamp	7s. per doz.

A trial gross for testing will be sent at these Prices on receipt of order, carriage paid.

SOLE MANUFACTURERS:
The General Incandescent Company, Ltd.,
Telegrams: "ASABLAZO LONDON." 56, CITY ROAD, LONDON, E.C. Telephone No. 9536 London Wall.

Chap. I. **The Humors of Gas-Fitting.** *June 7, '04.*

Most of my readers, presumably, have come into contact with that native genius, which well-meaning but misguided alarmists assure us is not properly encouraged in this benighted country of ours. But genius is an insuppressible element in our national constitution—like murder, it *will* out, and it is not for us to complain if—owing to adverse circumstances—it happens to express itself in somewhat awkward terms.



An examination of the museum which has been created by involuntary contributions to the technology of the Lucas Lamp, and is in the hands of Messrs. Moffat's, Ltd., 155, Farringdon Road, E.C., affords an excellent insight into the weird working of this robust genius. I have selected certain objects from this curio-collection, which, I feel sure, will interest my readers, while serving as excellent illustrations of the old adage: "Where there's a will there's a way."

No. 1 in the accompanying illustration represents, I dare not say, a gauze, but certainly something that was *meant* for a gauze. It was returned on a Lucas burner which "would not give satisfactory results"! No. 2 shows a gauze which the inventor of the Lucas Lamp thought most suitable for his designs, and which is consequently patronized by Messrs. Moffat's. It would have meant very little trouble and expense for the user of this particular lamp to secure such a gauze, but having a mind of a mechanical turn he has instead set to work to realize his own ideas of such an accessory. The difference between the two is at once apparent; but I could not undertake to say which is superior to the other in mechanical merits. Sometimes, however, fine ideas will be found *not to work*, and I grieve to say that this may be one of them.

No. 3 represents an improvement upon the bye-pass nipple which is usually associated with the Lucas Light burner (No. 4 showing its authorized counterpart), and is another, though less alarming, illustration of what can be done when the shift-making spirit of our inventive friends runs riot upon the mysteries of the Lucas Lamp. (For second part of this series see "*The Gas World*," June 11.)

THE HORSELEY CO., LTD., TIPTON, STAFFORDSHIRE.

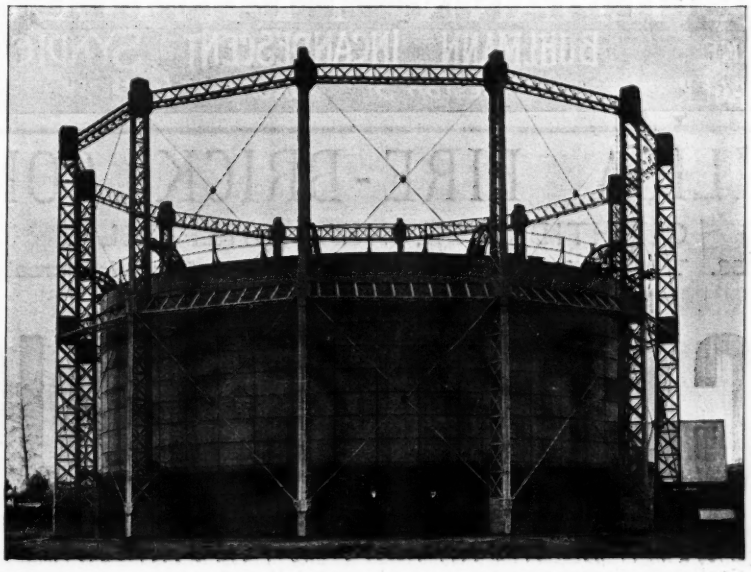
MAKERS OF **GASHOLDERS & GAS PLANT.**

PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES, PIPES, LAMP-PILLARS, RETORT-FITTINGS, ETC.

ALSO ALL KINDS OF

STRUCTURAL IRON AND STEEL WORK

BRIDGES, ROOFS, PIERS, ETC.



WORKS & HEAD OFFICE:
TIPTON, STAFFORDSHIRE.

LONDON OFFICE:
11, VICTORIA STREET, WESTMINSTER.

TELEGRAPHIC ADDRESSES:
"HORSELEY, TIPTON."
"GALILEO, LONDON."

GAS
THE WINSTANLEY SPECIALTY COY.
ENGINEERS

GAS ENGINEERS.

CONTRACTORS FOR, AND ERECTORS OF, ALL GAS-WORKS PLANT.

REGENERATORS, GENERATORS, AND DIRECT-FIRED RETORTS.

RESULTS GUARANTEED.

COMPLETE INSTALLATIONS OF HORIZONTAL AND INCLINED RETORTS.

ADDRESS—

NEWTON CHAMBERS, CANNON ST., **BIRMINGHAM.**

MOBBERLEY & PERRY,

STOURBRIDGE.

Give SPECIAL and PERSONAL ATTENTION to the execution of all orders

Bricks for Water Gas Plants and Chequer Bricks always in Stock.

INCLINED, HORIZONTAL, & SEGMENTAL RETORTS OF BEST QUALITY.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, NEAR SHEFFIELD.

Established 1858. The First Manufactory of Silica and Dinas Fire-Bricks erected in England.

MANUFACTURERS OF

SILICA FIRE-BRICKS

TRADE MARK "SILICA."

Our Silica Bricks have gained a high reputation for Unsurpassed Quality in most of the leading Firms in England and on the Continent. Export orders delivered Liverpool, Hull, Grimsby, or the Tyne.

GENERAL HEATING & LIGHTING CO., LTD.,

(MOELLER'S SYSTEM.)

26, VICTORIA STREET, LONDON, S.W.

Greatest and most equal Distribution of Light.

Easily Cleaned.

Renewal of Glass cheap.

Breakage of Glass reduced to a Minimum.

Enamelled Top and Reflector.

Low Price combined with Soundness of Construction.

Can be fitted to any Column.

Wind and Water Proof.

Top can be supplied Enamelled in all colours.

Price Lists of Lanterns and special Burners submitted on application.

Copper Lantern Top can be supplied if required.

No Repairs.

Artistic, graceful appearance.

A NEW SYSTEM OF STREET LIGHTING (Patent).

PATENT "STANDARD" PURIFYING GRIDS.

Orders received for **148** Purifiers.

RECENT ORDERS: Ilford Gas Company, Barnet District Gas and Water Company, and Wadhurst and Ticehurst District Gas Company.

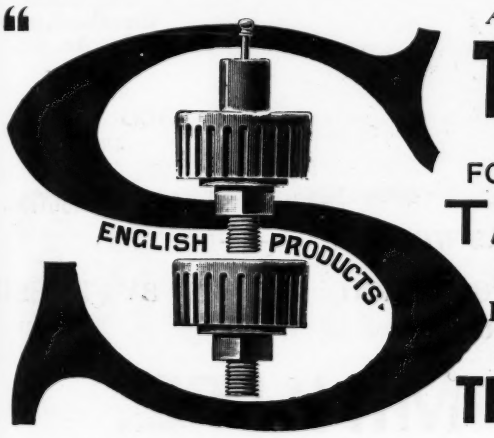
CAPACITY OF PURIFIERS MORE LARGELY INCREASED.

Pressure and Cost of Emptying and Filling more Largely Reduced than by any other System.

Figures from Users verifying this on application to—

KIRKHAM, HULETT, & CHANDLER, LTD. PALACE CHAMBERS, BRIDGE ST., WESTMINSTER, S.W.

"



A BOON TO MASTER, MAN, and MACHINE.

TAUFFER'S LUBRICANT"

REG. TRADE MARK.

CENTIGRADE FOR HOT PLACES

TANDARD MACHINE GREASE.

AVING UP TO **90** PER CENT. OVER LIQUID OIL.

Patent "Unbreakable" & "Telltale" Stauffer Lubricators.

SOLE MAKERS—

TRIER BROS., 1, GT. GEORGE ST., WESTMINSTER, LONDON.

CUMBERLAND WORKS, NEW CHURCH RD., CAMBERWELL.

ARROL-FOULIS

PATENT HYDRAULIC MACHINERY

FOR

CHARGING AND DRAWING GAS-RETORTS

SIR WILLIAM ARROL & CO., Ltd., Sole Makers,
DALMARNOCK IRON-WORKS, BRIDGETON,
GLASGOW.

LONDON ADDRESS: 32, VICTORIA STREET, WESTMINSTER, S.W.

PLANS AND ESTIMATES FURNISHED ON APPLICATION.

THE **ARROL-FOULIS** MACHINES Are Employed at the following Works—

GLASGOW GAS-WORKS—
Tradeston.
Dawsholm.
Dalmarnock.

GASLIGHT & COKE COMPANY—
Beckton.
Shoreditch.
Bromley.

SOUTH METROPOLITAN GAS COMPANY—
East Greenwich
Vauxhall.
Rotherhithe.

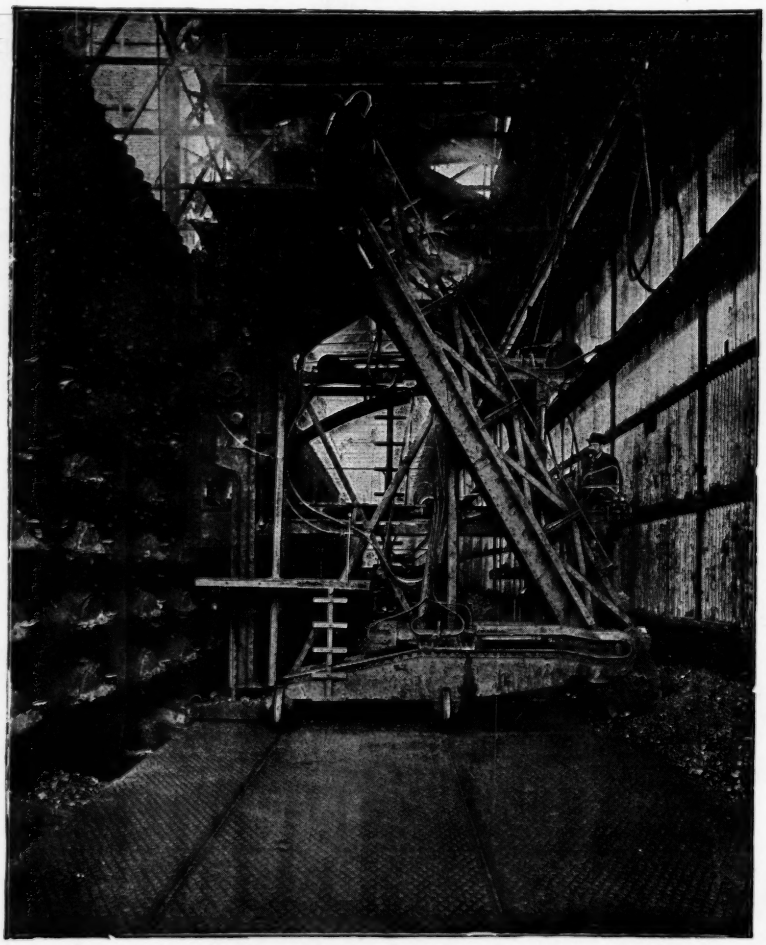
COMMERCIAL GAS-WORKS—
Wapping.
Poplar.

BROMLEY GAS-WORKS (KENT).

EDINBURGH GAS-WORKS.

LIVERPOOL GAS-WORKS.

BRIGHTON GAS-WORKS.



ROTHERHITHE GAS-WORKS.

THE **ARROL-FOULIS** MACHINES Are Employed at the following Works—

LEEDS GAS-WORKS.

BIRMINGHAM GAS-WORKS.

BRITISH GAS CO.—
Hull.

BOLTON GAS-WORKS.

IMPERIAL CONTINENTAL GAS ASSOCIATION—
Amsterdam.
Vienna.
Berlin.

HAGUE CORPORATION GAS-WORKS—
Hague.

METROPOLITAN GAS-WORKS—
Melbourne.

CLEVELAND GAS-WORKS—
Cleveland, Ohio, &c., &c., &c.

NEARLY **300** MACHINES ARE AT WORK OR IN COURSE OF CONSTRUCTION.

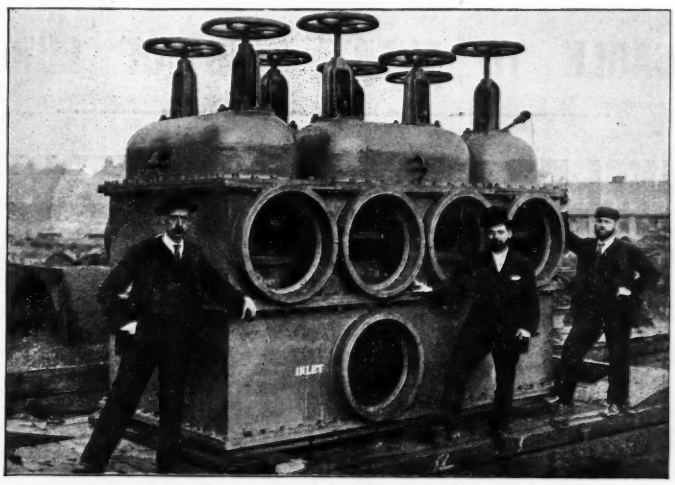
THE TIME TAKEN TO DRAW AND CHARGE EACH RETORT BY THESE MACHINES AVERAGES

UNDER ONE MINUTE.

Valves

AND

Special Pipes.



"WECK'S" 24-INCH CENTRE-VALVE.

ORIGINAL MAKERS OF

The "Weck" Valve.

SEND FOR ESTIMATES.

ASHMORE, BENSON, PEASE, & CO., LTD.,

Stockton-on-Tees.

Telegrams:
"GASHOLDER."

JÄGER'S PATENT GRIDS.

43 INSTALLATIONS COMPRISING OVER **137** PURIFIERS

HAVE BEEN ORDERED TO DATE IN

ENGLISH AND CONTINENTAL GAS-WORKS.

Capacity of Purifiers Doubled.

Pressure Reduced Considerably.

Material Exhausted Thoroughly.

APPLICABLE TO EVERY KIND OF PURIFIER.

SAML. CUTLER & SONS, MILLWALL, LONDON.

SOLE LICENSEES AND MANUFACTURERS.

161.

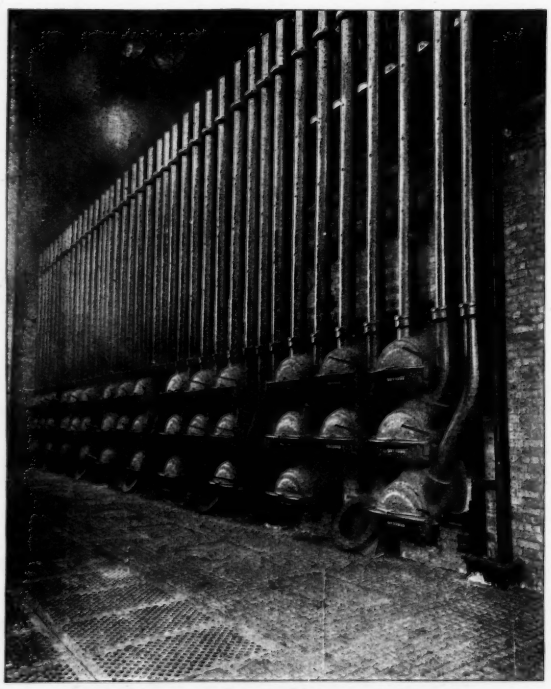
INCLINED RETORTS.

WE

make every single part of the Installation in our own Works at

RETFORD,

Including the Roofs, Coal Tippers, Coal Breakers, Coal Elevators, Coal Conveyors, Hot Coke Conveyors and Screening Plants, Retort Mouthpieces with Self-Sealing Lids, Stage Floors, Foul and Hydraulic Mains, Ascension, Arch, and Dip Pipes, &c., &c.



WE

only buy the Bricks and Raw Material. So under these conditions we have gained a

REPUTATION

for nothing but the Highest Class of Work, as can be seen in our Illustrations at Smethwick, Leek, Liverpool, Malvern, Shipley, &c., &c.

W. J. JENKINS & CO., Ltd., RETFORD.

BIGGS, WALL, & Co.

13, CROSS STREET, FINSBURY PAVEMENT, LONDON, E.C.

Telegrams: "RAGOUT, LONDON." Telephone 273 CENTRAL.

METHANE-HYDROGEN WATER-GAS PLANT.

3 gallons Tar and 20 lbs. Coke produce 1000 cubic feet 10 to 12 Candle Power Gas of the following composition—

Hydrogen	64·4 per cent.
Methane	12·0 „ „
Unsaturated Hydrocarbons	3·0 „ „
Carbon Monoxide	15·0 „ „
Nitrogen and Carbon Dioxide	5·6 „ „
	100·0
Calorific Value	400 B.T.U.

See **Prof. VIVIAN B. LEWES'S** Lecture before Society of Arts, reported in the "JOURNAL OF GAS LIGHTING," Dec. 9, 1902.

Telephone No. 103. Telegraphic Address: "ELEVATOR, HASLINGDEN."

S. S. STOTT & CO.,

ENGINEERS HASLINGDEN, NR. MANCHESTER.

COAL AND COKE ELEVATORS & CONVEYORS.

COAL AND COKE STORAGE PLANTS.

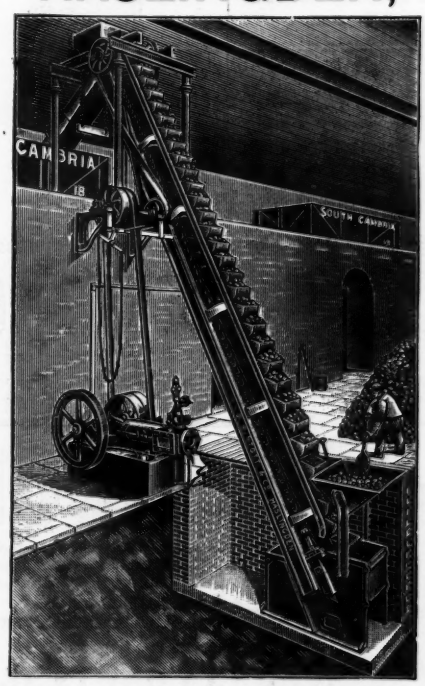
COAL AND COKE BREAKERS.

WHARF ELEVATORS FOR UNLOADING BARGES.

ELEVATORS & CONVEYORS for BOILER-HOUSES.

STAMPED AND RIVETED STEEL ELEVATOR BUCKETS.

DETACHABLE CHAINS AND SPROCKET WHEELS.



Coke Elevator Loading Railway Waggons.

LIME AND OXIDE ELEVATORS & CONVEYORS.

HIGH-CLASS STEAM-ENGINES up to 1000-Horse Power.

PUMPS, HORIZONTAL AND VERTICAL, SINGLE, DOUBLE, or THREE-THROW, for WATER-WORKS, &c.

BEAM PUMPING-ENGINES.

AIR-COMPRESSORS.

BELT PULLEYS, ROPE PULLEYS, GEARING, &c., &c.

CASES FOR BINDING QUARTERLY VOLUMES OF THE "JOURNAL"

PRICE 2s. EACH.

THE THAMES BANK IRON CO.

UPPER GROUND STREET, LONDON, S.E.

SUPPLY FROM STOCK

CAST-IRON RETORTS

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

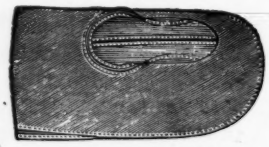
Sole Manufacturers of **LYON'S "PATENT" GAS-MAIN SYPHONS.**

AGENTS FOR

ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

THOMAS BUGDEN, MANUFACTURER OF

TAR and LIQUOR HOSE. and Special AIR TUBING.



BELLOWS made to inflate a 48-inch Bag under One Minute. Various sizes made

STOKERS' MITTS. Made from best Tanned Leather.

India-rubber Goods of every description. Leather Bands Oils, &c., Diving and Wading Dresses, Waterproof Coats and Capes, Sewer Boots, and Theatrical Air-Proof Dresses.

Fire-Engine Hose and Appliances.

Best Materials and Workmanship Guaranteed.

Miners' Woollen Jackets (Also made in Blue Serge.) **No. 1, 12/- each; No. 2, 9/6.**

Gas-Bags for Mains All Seams Stitched. and Taped.

116-118, GOSWELL ROAD, E.C.

SLOT GOVERNOR BURNERS

(Hawkins and Barton's Patent).

Give Excellent Results and no Trouble.

1093, 6s. per doz. 1095, 7s. per doz. 1094, 7s. per doz 1096, 6s. per doz.

SUBJECT TO DISCOUNT.

GAS APPARATUS CO., PETERBOROUGH, ENGLAND.

THE LEEDS FIRECLAY CO., LTD.

JOSEPH CLIFF & SONS' BRANCH.

Cliff's Wortley Silica Bricks.

FOR Arches and Crowns where high heats are required. They contain over 90 per cent. of Silica, and are nearly stationary under the influence of heat, swelling a little rather than contracting. They are not like a Gannister or Dinas Brick, but a Fire-Brick of a highly Silicious nature.

Cliff's Wortley Aluminous Bricks.

THESE are for Side Walls where great wear and tear takes place. Are made of a specially prepared mixture, are high in Alumina, and are what is termed a HARD FIRE-BRICK.

BALTIC WHARF, WATERLOO BRIDGE, LONDON, S.E.

Liverpool: Leeds Street. Leeds: Queen Street.

THE "WIS" LAMP

is

STILL RUNNING,

and running

VERY, VERY FAST

away from

ALL COMPETITORS,

and has proved its right to the title of the

PREMIER HIGH-POWER LAMP,

giving best results.

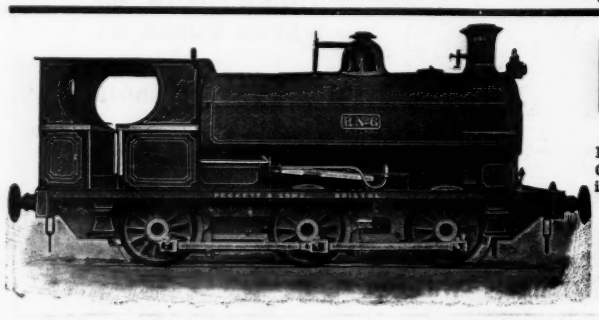
CHEAP AND RELIABLE.

INDOOR OR OUTDOOR.

62, FARRINGDON STREET, **POND & CO.** LONDON, E.C.

Patentees and Manufacturers of the

"GALEPROOF" STREET LANTERN, "POND" ARC LAMP, &c.



LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for immediate Delivery.

Photographs, Specifications, and Prices on Application.

PECKETT & SONS, Atlas Locomotive Works, **BRISTOL.**

Telegraphic Address: "PECKETT, BRISTOL."

BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
ESTABLISHED 1860.

CLAYTON SON & Co Ltd
LEEDS
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD ALSO
THE ORIGINAL MAKERS OF
SPIRAL GUIDED GASHOLDERS
MAKERS OF ALL KINDS OF
STRUCTURAL IRON & STEEL WORK. STEEL FRAMED BUILDINGS ROOFS RETORT FITTINGS PURIFIERS RETORT LIDS ANTIFREEZERS for Gasholders
STEEL TANKS
OF ALL SIZES
MAKERS OF THE LARGEST IN THE WORLD.
GASHOLDERS
OF EVERY DESCRIPTION & SIZE.
HIGH CLASS BOILERS FITTED WITH DEIGHTON'S PATENT CORRUGATED FLUES.
Telegrams "GAS LEEDS." London Office 60 Queen Victoria St E.C.

MANNESMANN

LAMP POSTS
made throughout of
WELDLESS STEEL TUBING
including base, ring, and ladder rest.

Light, Strong, Unbreakable, and Cheap.

GAS, WATER, & STEAM TUBES AND FITTINGS.

WELDLESS STEEL SPIGOT & FAUCET PIPES for Gas and Water Mains.

Tubes can be supplied up to 10 inches diameter and in lengths up to 30 feet.

THE BRITISH MANNESMANN TUBE COMPANY, LTD.,
110, CANNON ST., LONDON, E.C.
Birmingham Depôt: Bridge Works, LISTER ST.
Works: LANDORE, SOUTH WALES.

R. & J. DEMPSTER, LTD.,

INCREASED CAPACITY
WITH
REDUCED PRESSURE.
LONGER CHARGES.
ORDINARY
GRIDS.

IMPROVEMENTS IN PURIFIERS.

WITH
or WITHOUT
WATER LUTES.
PATENT RUBBER
FASTENING.
SIMPLE VALVES and PIPES.

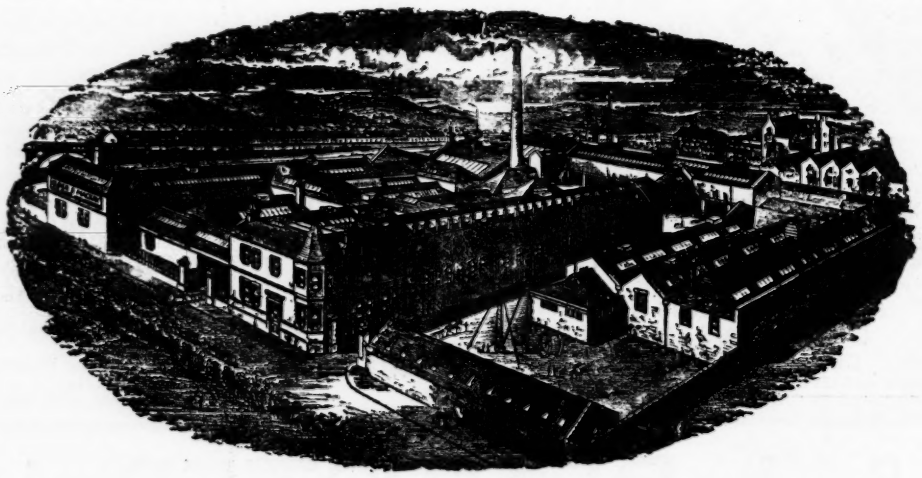
Write for Particulars.

MANCHESTER.

ALDER & MACKAY

ESTABLISHED 1850.

GAS-METER MANUFACTURERS.



SPECIALITIES.

Dry Meters in Cast-Iron Cases.

Wet and Dry Prepayment Meters.

Green's Patent Underground Wet Meters.

NEW GRANGE WORKS, Telephone No. 51 Western. EDINBURGH.

Telegrams: "ALDER" EDINBURGH OR BRADFORD.

VENTNOR STREET WORKS, Telephone No. 1222. BRADFORD.

Printed for WALTER KING by King, Sell, & Olding, Ltd.; and Published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday,